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THE AMERICAN GAS LIGHT JOURNAL

VOL. CIII., No. 4. NEW YORK, JULY 26, 1915. WHOLE No. 2,094

KNOWNS AND UNKNOWNS IN THE LIGHTING OF SMALL INTERIORS.

[From a Paper by J. R. CRAVATH, read before the Chicago Section, I. E. S.]

In attempting to summarize some of the principal known and established facts in the illumination of small rooms, I can present but my own point of view, because no two workers would be likely to agree as to just what can be considered "known," what "questionable" and what "unknown." I shall endeavor to take what appears to me a rather conservative attitude; and much said concerning the lighting of small interiors will apply equally to all classes of interior lighting.

Lighting of small interiors affects the comfort, convenience and pleasure of far more people than any other class of lighting.

The subject will be taken up under three heads, as follows:

(1) Comfort, efficiency and safety of the eyes.
(2) Physical efficiency in the utilization of the light generated.
(3) Esthetic or artistic effects.

Of these three the first is by all means first in order of importance. As to which of the others is the more important depends on the purpose for which the room is used. For the benefit of those who might say that psychology should be introduced somewhere in my general classification, it may be pointed out that psychology undoubtedly enters into questions of comfort and efficiency of the eyes, and esthetic effects.

As a broad principle the comfort and efficiency of the eye depends upon the distribution of brightness within the range of vision. It should be kept in mind that what is said regarding brightness values that are good or bad for the eye, assumes that the brightness under consideration is actually within the range of vision. The eye is concerned only with what it sees.

What is said as to the effects of light upon the eye under a given set of conditions does not necessarily apply to all individuals, because there is much difference between what different eyes will stand. What is said here is intended as applying to most of the people most of the time.

In the discussion of brightness values, figures will be given in candlepower per square inch and in "apparent foot-candles," the latter meaning a brightness equivalent to that of a perfect mat diffusing and reflecting surface illuminated to an intensity of 1 foot-candle. (It is 452 times the candlepower per square inch.) While this is not yet a generally accepted method of expression, I believe it is valuable in conveying a more definite mental picture than an expression in candlepower per unit area.

It is known that a clear blue sky having a brightness of about 2 candlepower per square inch, or 904 apparent foot-candles, can be faced with entire comfort when it fills the upper part of our field of vision outdoors in the open or near a window, provided the lower part of our field of vision consists of green or gray fields or some equally dark surface. It is only when the lower part of the visual field is filled with light reflected from snow or desert or light colored roadway that a normal person experiences discomfort facing a blue sky. However, if one faces a small patch of this blue sky from the rear of a small narrow office, so that it stands as a bright patch amid dark surroundings, the majority of people will experience discomfort within an hour or two. The second known fact in connection with the comfort of the eye and brightness of surfaces is that, even though a given surface may be comfortable to face continuously under bright surroundings, a surface of the same brightness if presented so as to be in sharp contrast with its surroundings (that is very much brighter than its surroundings) may cause decided discomfort if continually within the field of vision for some time.

In the artificial lighting of small rooms it is known, from the experience of observant people, that the exposure of undiffused light sources, if of sufficient candle power to adequately light the room according to modern ideas, will cause discomfort to the eyes. This is assuming, as said before, that the bright sources are exposed to the eye for some considerable period. Beginning at the top of the list the brightest source of artificial light with which one commonly deals is the tungsten lamp, with a brightness of over 1,060-candle power per square inch, or about 479,000 apparent foot candles. The gas-filled lamp is probably 2,500 to 3,000 or more candle power per square inch, or 1,130,000 to 1,350,000 apparent foot candles. As to the bad effect of exposed lamps of such brilliancy in small rooms, there is practical agreement among illuminating engineers and oculists, although it is not known or agreed just what is the real cause of the discomfort or fatigue experienced. Coming down from tungsten lamps there is the carbon lamp, which is still uncomfortably bright, from 400 to 600-candle power per square inch, corresponding to 180,000 to 270,000 apparent foot-candles. The Welsbach mantle of about 31-candle power per square inch, or 14,000 apparent foot-candles, may also be included among the uncomfortably bright sources. Next comes a class of light sources about which there has been some controversy—those just enemerated when enclosed in diffusing glass. A frosted tungsten lamp bulb has a brightness of 2 to 8-candle power per square inch, or 900 to 3,600 apparent foot-candles; approaching in brightness values the sky in its various aspects. However, I have already shown that sky brightness amid comparatively dark surroundings can be uncomfortable, and the surroundings in an artificially lighted room are very dark compared with the frosted tungsten lamp.

Evidence is steadily accumulating against the use of exposed sources of this order of brightness where they must be faced continuously. To the personal experience of many who find it unpleasant to face such sources, there have been added the investigations of Dr. C. E. Ferree, who, by his method of testing for eye fatigue, has been able to reduce to a quantitative basis observations that heretofore could be made only in haphazard fashion. While Dr. Ferree's test has been largely confined to his own laboratory, I believe that as a result of these experiments it may be put down as one of the knowns that, in the lighting of small rooms where the exposed sources are such as to have a brightness of over 1-candle power per square inch or 452 apparent foot-candles, trouble from eye fatigue and discomfort will follow from continuous work with the light shining in the eyes. Below 1-candle power per square inch brightness for the exposed light sources there is uncertainty as to the effects. The heavy pressed bowls used for semi-direct lighting of small interiors generally have a brightness from about 2-candle power per square inch, or 904 apparent foot-candles, down to 0.075-candle power per square inch, or 34 apparent foot-candles. With pure indirect lighting the brightness of the ceiling (which is the visible source of light) usually falls between 50 and 4 apparent foot-candles.

The researches of Dr. Ferree seem to indicate that there is some eye fatigue when facing units of 0.71-candle power per squar

inch, or 320 apparent foot-candles in a room with light colored walls. Extensive tests I made last year indicated no more fatigue with the subjects facing a brightness of 0.35-candle power per square inch, corresponding to 156 apparent foot-candles, from semi-direct lighting bowls than was experienced with a pure indirect system. Of course, the indirect system gives the minimum of surface brightness with which it is possible to accomplish artificial illumination. As far as present information goes it seems probable that a brightness of about 0.5-candle power per square inch, or 230 apparent foot-candles, for semi-direct or luminous bowl indirect lighting equipment for small rooms should be about the maximum limit. Some semi-direct bowls offer considerably greater brightness than this, while others fall well under the limit. What has just been said applies to semi-direct and luminous bowl fixtures of the sizes commonly necessary to light a room. If the bright area exposed is small so that the total candle power is low the limits suggested may be comfortably exceeded.

So far only the effect of the light that goes directly from the source to the eye has been considered. There is, however, another class of effects, the reflection from smooth or polished surfaces, one example the "glare from paper." One thoroughly known fact is the annoyance and eye-strain of glare from paper, polished tables and other smooth polished surfaces; the result of reflection of the original light sources. It is obvious that anything done to diffuse the light from such sources—that is, to enlarge the area from which the light comes—and reduce the brightness will be beneficial in reducing the glare from paper. Things beneficial in diffusing the light from exposed surfaces are beneficial in reducing this glare. In some cases, as with a shaded reading or desk lamp, the source of light is shaded from the eye, but the position of the lamp with reference to the paper and the eye is all important, as the eye should not receive glare from the page. This correct position may or may not be easy to attain. It may be taken as demonstrated, that diffused light is best for reading, and working on papers and polished surfaces. Much of the pleasing quality of daylight for reading is due to its diffuse character. For sewing on cloth where the direction of the light is such that shadows do not interfere, direct light is satisfactory.

Tests on the amount of light preferred for reading shows that the majority of people asked for a lower intensity with diffuse than with direct or more uni-directional lighting. In my opinion, considering the method of making the tests, these results should be interpreted as meaning that the diffuse lighting is more satisfactory, rather than as indicating that one can with safety plan for less illumination with diffused or indirect systems. When the quality of illumination is not satisfactory most people ask for more quantity regardless of the real trouble.

It is established beyond controversy that a purely localized illumination is not satisfactory, the eye not having been evolved under conditions such as prevail with a bright area in the center of the visual field with the surroundings dark. This is the condition that one finds with purely localized light such as with an opaque shade concenerating light on the spot upon which we are working, the rest of the room being in darkness.

If we cannot get all our light for working from diffusing sources such as day skylight and indirect artificial light, we should at least provide as large a portion as possible of the total light in the shape of general diffuse light. If necessary for reasons of economy, this can then be supplemented by such localized light as is necessary for the particular purpose in hand. The presence of a considerable amount of general lighting, especially if it is well diffused, greatly enhances the comfort with which work can be done under localized light.

In the lighting of small offices, daylight coming through windows usually has one imporiant advantage over diffused artificial light from a ceiling, namely, the direction. Even with the best diffused indirect artificial light or natural sky light from windows, there is some trouble from specular reflection or glare from paper. It is easier to avoid this when the light comes from one side, as from a window, than when it comes from above. In a large interior these difficulties largely disappear because of the large expanse of lighted ceiling, which increases the diffuse character of the light received upon a page.

Those who would put unshaded bracket or table lamps almost in the line of vision in a small room should remember that it has been well demonstrated in connection with experiments on street lighting, that when a lamp is brought within about 25 degrees of the object one is looking at, it has a blinding effect which necessitates more illumination on the object to see it with equal clearness. This effect increases as the light is brought nearer to the line of the center of vision.

When the edge of a lamp shade is below the level of the eye, all that is necessary to guard the eye from the direct light of the source is to have it slightly above the edge of the shade. When, however, the edge of the shade is above the eye much more care must be used as to the correct position of the source with reference to the shade or reflector. A lamp at ordinary chandelier heights can only be properly shaded when the edge of the reflector protects the eyes from direct rays emanating from the lamp at angles in excess of about 25° from the vertical. The eyebrows will shade the eyes when the person is within the 25° zone and the reflector will shade the eyes when outside,

As to effect of color on eye efficiency and comfort little is known, save that a nearly one color light like the mercury vapor is better for work on fine details.

In lighting small offices, and desk lighting, shadows play an important part. The more diffused the light the greater the freedom from sharp shadows. If semi-direct or indirect lighting is employed the minimum of shadow is obtained when the brightness of the bowl does not exceed that of the ceiling. Annoyance from shadows is not serious, however, until the light direct from the bowl exceeds 15% of the total. The brightness of the fixture bowls in semi-direct lighting is limited more by the importance of avoiding shadows than by the brightness values that will be comfortable to face. In other words, it is usually permissible to use a somewhat brighter bowl in a living room or dining room than in an office.

Efficiency of Light Utilization.—By efficiency is meant the percentage of the light generated delivered on a plane level with a common table top, 30 inches (76.2 cm.) from the floor. It depends on: (1) The color or reflecting power of ceiling, walls and floor; (2) the shape of the room; (3) the reflector and globe equipment; (4) the location of the lamps.

Color of ceilings, walls and floors may make a difference of over 4 to 1 in the illumination; but with common colors I think 2 to 1 would be the ordinary range unless it is attempted to use indirect lights with a dark ceiling.

A low square room will show the least loss of light by absorption and a high narrow room the greatest. In other words, the greater the wall area in proportion to the floor area the lower the efficiency.

The globe or reflector equipment has a great influence on efficiancy, but the comparative rank of the different equipments will change with room colorings and lamp locations. For example, an indirect system obviously is more affected by ceiling color than a direct system.

A central location of lamps is more efficient than near the walls.

A table of efficiencies even for the commonest of practical conditions would be too bulky for ordinary use. However, the following will serve to give an idea of the usual range of efficiency.

For a room 15′ square by 9′ high, assuming a light ceiling, the light falling upon the working plane in percentage of the total light emitted from a tungsten or gas mantle lamp at one central outlet will be about as Table I:

TABLE I.

Efficient bowl-shaped opal or prismatic reflectors at ceiling	45 to 60%
Frosted enclosing globe at ceiling	25 to 40%
Bare unshaded lamp near ceiling	30 to 45%
Indirect, mirrored reflectors	25 to 35%
Indirect, white enameled reflectors	21 to 31%
Mirrored reflector, at ceiling, deep	70 to 80%
Aluminum finished metal at ceiling, deep	45 to 60%
White enameled metal at ceiling	45 to 60%

In office buildings in cities where soft coal is used, a decrease of illumination due to accumulation of dirt may be figured at about 11% in one month if reflectors are employed.

Esthetic or Artistic Effects.—In this part of the subject it is difficult to establish facts because individual tastes and opinions vary so greatly. The most that can be done is to note the observed trend of public opinion. First it must be recognized that many people will not consider that any arrangement, style or design looks right unless it corresponds closely with present conditions. With some other noveltys, and change rather than adherence to present conditions are sought.

For generations artificial lighting has been done with illuminants rich in yellow and deficient in green and blue. The only exception to this is the Welsbach gas mantle, and from a statement made at our last meeting by Mr. Luther, that type of mantle is most popular in small rooms that tends to bring out the reds and yellows

and suppresses the greens and blues. It may be taken, as established, that any light not having a sufficient percentage of red and yellow in its composition, or to much green and blue, is likely to give a ghastly appearance to hands and faces. It also renders unattractive rugs, carpets and wall paper in which yellow and red hues are prominent.

It is a matter of personal opinion as to whether the gas filled tungsten lamp and amber tint Welsbach mantle give a light that needs modification toward the yellow in order to be most acceptable for residences. As these sources are considerably more yellow than any kind of daylight it seems probable that a part of the objections to them is due to the fact that they are whiter than the artificial illuminants to which we have been most accustomed, and that these objections will gradually become less as the whiter types of illuminants become more common. Nevertheless, it must be accepted as demonstrated that the yellow illuminants of the older types, or the present illuminants modified by globes or ceiling tints to make them more yellow, produce some very agreeable effects on complexions and on some kinds of furnishings. With direct lighting, the color can be controlled by glassware, and in indirect lighting the color of the ceiling largely influences ultimate results. Any color modifications, however, means loss of efficiency and allowance must be made for this.

The direction and character of shadows have important effects on objects in a room and have to be more considered in small interiors where the sources of light are fewer than in large interiors. Where light is largely un-directional, that is, direct from a small bright source with insufficient diffuse lighting to modify it, the sharp shadows which result help to bring out wrinkles and give a harsh appearance to complexion and features. Diffuse lighting, either from ceilings and walls or from windows and skylight, does not entirely do away with shadows, but rather softens them to an extent that renders the appearance of objects much more pleasing.

As to whether there should be a visible source of light on the lighting fixture, there is no agreement. Many like to see a little light coming from the fixture for decorative purposes; others care nothing about it.

To some, the localized lighting effect produced by a dome over the dining table, or by a table reading lamp that lights one spot brightly and leaves the rest of the room somewhat in shade, produces a cozy effect that is pleasant. Others that cannot feel cheerful without having the whole room brightly lighted.

Objections have been raised to indirect and semi-direct lighting, that the ceiling is too bright and that it reverses the old order of things. Others do not think of this effect. Tastes in these matters are largely a question of environment and education.

Machine for Cleaning Ascension Pipes.

The "Gas World," London, gives this description of a machine designed by J. J. Allen and made by Pease & Partners, for cleaning the ascension pipes of coke ovens.

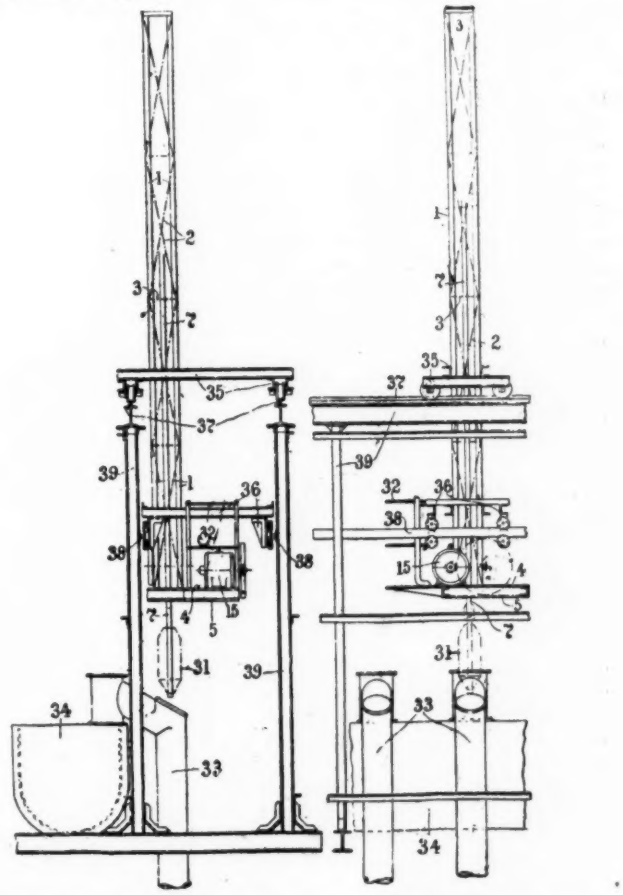
The machine consists of a mechanical arrangement traveling on an overhead wire, drawn tight in line from end to end of a battery of coke ovens, of sufficient height and directly over the centre openings of the ascension pipes. The body of the machine is constructed of angle-iron, suitably braced, and the bottom plates are riveted to cross channel-bars at a suitable distance apart to allow for the gearing necessary to rotate the cutter-bar. The upper plate is extended to carry a small electric motor which rotates the cutters and effects the rising and falling of the bar. The cutter bar is of 2-inch square iron, carried up and down inside of the frame by a plate. The bar is pivoted through the centre of the plate and so held as to allow it to revolve, and the plate carrying it to descend and ascend by chain gearing on two sides, connected with the gearing rotating the cutters. Attached to the bottom of the frame are clamps to fasten it to the pipes to be cleaned, steadying and holding the whole in position when working.

Assuming the machine to be in the position shown in the drawings, the motor, 15, is started, and the gearing imparts a slow rotary motion to the cutter-bar, 7, while it is simultaneously lowered into the ascension pipe, and the pipe effectually cleaned throughout its length. The motor is then reversed; a quick drive is imparted to the shaft, the cutter-bar is rotated in the opposite direction faster, and the cutter, 31. raised from the pipe. The machine is then moved on the overhead structure, 39, to bring the cutter-bar over the next pipe.

The following specific advantages are claimed for the machine;

1. More uniform rate of coking because of the uniform outlet for the gas.
2. Coking time reduced by about 12½%, owing to larger outlet for gas and the prevention of back pressure on the ovens.
3. Increase of by-products as the result of thorough carbonization of charge.
4. Increase in the power produced at waste heat stations.
5. Increased life of ovens by ensuring fewer "stickers," which tend to thrust the walls out of position, and allow the gases to travel to the chimney stack.

The rebuilding oven walls is, of course, a serious item, apart from any other consideration. Dirty ascension pipes are a drawback for other reasons, as when the outlet is too small to get rid of the gases it prevents the oven from burning off properly; and more power has to be used in ramming the oven, and if the coal has not carbonized sufficiently to stand the extra pressure, the coke jams and the oven walls tend to be pushed out of position. This causes leaky places in the brickwork, and when the oven is again charged the gas and tarry matter pass through into the heating chambers. This is a very serious matter, as sooty flues are created and proper combustion cannot take place, preventing the oven burning off in proper time. This not only affects the particular oven, but also the adjoining ones served by the same flues. Thus the walls of a whole battery may got out of shape and necessitate very heavy repairs.



Only one man is needed to work the pipe cleaner for, say, 120 ovens. He should also be able to assist in keeping the tools or cutters in repair. It would only be necessary to go through the ascension pipes once a fortnight, so that he would have four days in that period to assist in other ways. It may be mentioned that the charge hole caps should not be taken off before the machine has cleaned the pipe, as this greatly increases the heat, which is detrimental to the cutters. The burning out of ascension pipes should not be allowed where a machine is employed.

LARGEST GASOLINE ENGINE.—What is said to be the largest gasoline engine ever built has been installed in a ferryboat for the transportation of trains across an arm of San Francisco Bay. Although designed for marine work, it shows the influence of automobile practice in its general appearance. It weighs approximately 120,000 pounds and develops 600-horse power. It has 4 cylinders of 16" bore, each weighing 1,700 pounds. The normal speed is 225 revolutions per minute.

THE VALUE OF WINDOW DISPLAY.

From a Discussion on "What is your Show Window Worth to Your Company," at the Mid-Year Conference, N. C. G. A.

L. C. HEISS.—The subject scheduled is, "What is your show Window Worth to your Company?" and it seems to me that the question, "Is it profitable for gas companies to have and make use of display windows?" should also be discussed. I believe most of you have a doubt as to the possibilities and results of window displays, due to the fact that you have not had any experience with this, which I consider one of the best of all advertising mediums. Unfortunately, like other forms of advertising it is impossible to accurately check results. However, one only has to walk through the retail business section of any town and look at the window displays, to decide who are the successful merchants. I believe it is advisable and profitable for gas companies to have and make use of display windows. If department stores, cigar stores, and other retail stores can increase their business by attractive window displays, gas companies can do so. Department stores find it pays to have attractive window displays, if not, do you suppose they would spend the money on them that they do? I know of a large store in Philadelphia that, 15 years ago, spent annually $100,000 on window display; another spent $50,000, another $35,000. They paid salaries to the managers of these departments as high as $10,000 annually and sent them abroad twice a year to get ideas.

If you have an office in the business section of your town, you should by all means have attactive display windows. It is next to impossible to have attractive displays unless you have attractive windows. If you have good windows and are not making use of them you are losing the opportunity of increasing your business in general and are really throwing good money away, as the windows have a rental value of from $10.00 to $200.00 a month. Advertising agents agree that, taking the country as a whole, the average display window of a city store has a rental value of at least $10.00 per week.

It is important to have some one in the company's employ devote most of his time to arranging the window displays. Of course, a person without any training in this line cannot produce first-class displays, but a person with average ability given an opportunity to study this work and provided with money for properties, can develop window displays of great profit to his company.

The expert window display man is a recognized necessity even in the smaller stores, who a few years ago would have laughed at the idea of spending money in that way.

Your window display committee last year tried to organize those in our industry who take care of window displays, in order that they could get the best results from their ideas. In order to do this it is necessary to have one man who could give all his time to this work. It was therefore recommended that the Association employ an expert to take charge of this work, which might be roughly outlined as follows:

First, to arrange a sub-organization of the men who arrange window displays, to be a clearing house for all original ideas in window display.

Second, to prepare a window display service to be issued each month or more often if required.

Third, to act as a clearing house on anything that pertains to decorations for the gas office window, interior or exterior.

Fourth, to try to have a standard window display throughout the gas industry for all special occasions, such as Gas Range Week, Lighting Week, etc., and to conform with all general advertising.

S. H. ALEXANDER.—I agree with Mr. Heiss that the impression of the smaller companies is that it is an expensive proposition. For instance, the buyers and the trimmers employed by large department stores get large salaries and go to Europe twice a year, and the little company cannot compete with the large concern because of the expense.

I think an arrangement could be made by the Window Committee or the Publicity Committee, could arrange such service for the smaller companies. The larger companies give attention to their window displays. The N. C. G. A. should supply service to the smaller companies. It seems to me we can devise means to secure this.

L. C. HEISS.—Before we go any further I would like to have it understood that we plan no expensive proposition. A series of 24 displays costing approximately $300.00, or each display will cost $12.50. These properties can be used over and over again, and changed to form different displays.

H. G. REED.—I think the work outlined in the "Bulletin" will be very beneficial, and I suggest that the Association adopt some standard for window trimming, and that the Committee get up photographs showing the right kind of displays. It would be very beneficial, especially to the small companies.

THE CHAIRMAN.—The Secretary suggests to me that it would be interesting to know whether the companies would be willing to pay $25.00 a year for such service. We could organize the service in New York and do it in a really thorough way. Now it depends upon committee work, which is not always satisfactory because the members cannot give sufficient time to it. It is really a one man job to organize this thing and see that good service is rendered.

PHILMER EVES.—This matter was taken up in the Publicity Committee yesterday. I was glad to find that a list of properties was in existence and would be published. It would be helpful to us, if gentlemen who have had some experience would tell us what those properties consist of, rather than to have us get an idea of them by reading the list published in the "Bulletin." Give us an idea of a few of the properties so that we may know what can be run with them, their advantages in decorative appearance, psychological suggestion, etc. I believe we would all say it is a good thing. Our company would be very pleased to have this service.

THE CHAIRMAN.—Mr. Heiss, will you outline how you use these properties.

L. C. HEISS.—The first item is a combination background panelled on one side; the other side represents a kitchen. The kitchen background can be used for a water heater display, or a gas range display. Reversed it makes a very nice set-up for a library; there being a mantle-piece in the center with a vase on it. It can also be used for a general display of heating stoves, portable lights, lamps, etc. Then we have an arbor background for floral decoration. At one time we used it in illustrating the preserving of fruit, and had a grape vine trailed about it. There are four colums and an arch, which can be draped or piped and lighted. There are six pedestals of assorted sizes, used principally for showing small appliances. We arrange for different elevations, so that all the articles shown will stand out prominently. There are four pieces of drapery; some of these have been used two or three hundred times.

There are six frames for show cards and advertising matter. There is a wax figure of a woman, used in a kitchen display at the ironing board, or engaged at some special thing in the kitchen. Costumes are furnished with the figure and there is an oil cloth floor covering, a felt floor covering and a rug. There are two imitation bronzes, made out of plaster-of-paris; two pair of curtains, a table, clock and other decorative material. These are all properties that can be used indefinitely. There is a folding screen that can be used back of any particular display. There is also a mirror, used when we show a park, to imitate water. There are artificial flowers, table covers, a centerpiece, and accessories such as tacks and pins and a hammer. Last of all there are signs.

This whole list cost only $300.00, and can be used for twenty-four displays; or two displays a month for twelve months. Each display can be changed, so that if you wish you can have a new display every week. For instance, if you have a heating stove display, you can take the stoves out and put in a portable light display, using the same properties.

J. P. ZINGG.—In my opinion the show window is worth just what you put in it. It is possible for the show window to foster the opinion, which still lingers in the mind of the customer, that the gas man sits at his desk and does not give a rap whether you come in and buy or not, because he will sell you gas anyhow. It is also possible to give the people, by a window display, the idea that you are an up-to-date merchant. The value of the show window is just what you make it. This morning I looked over a book entittled Lighting Window Displays, recently published. It describes the development of window displays, and shows the effect of three days display. The first three days 1812 people passed the window. The second day after the window was changed 2,025 people passed. Under the first method 250 people stopped. Under the second method 780 stopped. For the first 25 people came in, for the second 150 came in. Under the first 19 people purchased. Under the second 75 purchased. Last year a concern in London made two window displays of toilet soap. By the first in one week they sold five tons of soap. By the second display, lasting two weeks, they

sold 14 tons. I have in mind a display where it was necessary at certain times of the day to have a policeman to keep a passageway open along the sidewalk. That is pretty good advertising. Another display, a gas steam boiler with the pipe brought outside of the window and vapor coming out of the end of the pipe, created inquiries in the office of another gas company seven or eight miles away. I remember another good display of an automatic water heater. Outside of the window they had a sign fastened reading, "Turn the faucet and see the heater light."

H. J. GERLICH.—Our company is fortunately located on one of the busiest streets in Brooklyn. We have very large window spaces, and we utilize them once every month for action demonstrations of appliances. Our company dispenses both gas and electricity, and one or both windows are used alternately for the display of those two commodities.

In 1913 our company started a display of the "2,706 Reflex Lamp," and, in order to secure the co-operation of the merchants on the street we invited them to see the display. The result was that within 60 days we sold nearly 1,500 lamps at a good merchandizing profit. The putting on sale of those lamps increased the consumption of gas in various places 36.74%. In the month of March we began an electric light campaign, and with the aid of our windows sold $6,000 worth of merchandise within two weeks.

We ran another campaign on home lamps, and, without any effort by our salesman, are now in the eighth or ninth hundred of those lamps. Of course, where we sell a gas lamp, we maintain it. In some parts of this city I have gone a mile and seen only eight outside gas arcs. In our district we have in some blocks as high as 125 to 150 arcs. We credit the success of these campaigns to the windows, and the effective way they have been decorated.

Last Christmas we ran a sale of electric and gas appliances, and kept our office open at night, from the 15th to the 24th of December. In these nine days we sold $687 worth of electric appliances; we had approximately 3,000 persons there on Saturday night, so that it was necessary for the police to make room for people to move along the sidewalk.

During Gas Range Week we had a display of ranges in our windows, alternating them with the display of various appliances. The ordinary gas range in a window is not a very handsome display, but if you put something in the window with it, so that the display as a whole appeals to the people, you are doing something. From that particular display, that cost us $15, we sold, within an hour after it had been opened to public view, $240 worth of gas ranges.

Our show windows are worth to us approximately $500 a month. We also co-operate with the merchants in the block. On either side of our sales office are five and ten-cent stores, neither of which keep gas and electric lighting appliances, and both stores attract a great many people by their windows. We entered into the spirit of display, and agreed at least once a month to make some attractive display in our windows that would draw a crowd; and, in consideration of that promise, they gave us their outside lighting. I estimate the approximate consumption of gas—additional business secured through our show windows—to be close on to 1,250,000 cubic feet.

P. S. CONKLIN.—I have some figures of a special test of window displays that I think interesting. In a half hour the number of people who passed was 129; the number who stopped and looked was 36; the people who looked, but passed by, numbered 53; the people that passed without looking were 38; the people who came in to inquire about articles displayed in the window were, in number, 2.

We made a 5 weeks' test on similar appliances, from October 24th to November 21st, with the following result:

October 24th—Gas lighters, 274 sales.
October 31st—Toasters, 156.
November 7th—Toasters, 173.
November 14th—Matchless burners, 145.
November 21st—Gas lighters, 144.

These sales were directly traceable to our window displays. The display used was a gas fan and waving flag, a special meter with home lights and the center filled with lighters.

E. G. ALLEN.—I notice in the Bulletin that while you advocate window displays, you give us very little information as to how we are to go about doing it. If the Bulletin would tell us how to do these things, and also how to show others how to do them, it would be very beneficial. As it is now, the Bulletin, as a rule, is looked through and then passed on to the library. It is very seldom looked at again unless one has seen something particularly interesting or that appeals to him in his every-day work.

J. P. ZINGG.—Last year the Window Display Committee maintained a service in which they sent out a sketch showing the decoration of the window, and the arrangement of cards and posters and directions how to set them up. The report of the committee consists of three or four pages, and is quite full and explanatory. Perhaps the secretary has some of these reports that members could look at. All window trimmers, as far as we could get at them conveniently at Minneapolis, were given copies of that report. The idea of the committee was that this service should be enlarged, so that members of the Association would receive every month, or twice a month, not only a sketch of what you should put in your window, but how you should put it in.

THE CHAIRMAN.—Next year we hope to have more funds, and I want to have an expression of opinion from this meeting as to the feasibility of running a co-operative advertising service. We have a few samples here to-day. We would get out folders, and send them out in finished form to all companies, not merely proofs but the finished article, and will quote upon them prices lower than you could possibly get in your own city. We will be able to supply you stickers at $1 or $1.50 per thousand, of the same class that you pay $5 for in your own town. We would send them out each month, applicable to the conditions in the following month, so that you would receive them in ample season to decide whether you wanted to avail yourselves of them or not. This would also include a special newspaper service. We would send out a sheet of drawings, or cuts, for use in your local newspapers, together with a dozen or so prints of illustrations. You could look over that matter, having in view the business that you are intending to do the following month, and pick out those that you want and get them from the Association.

That is briefly what the service would mean. The Association would not have to go to any initial expense, and it would not make any profits. This can be made a very big thing, and it cannot fail if we get the interest of the Association back of it. I want to find out whether such interest does exist, and whether, in your opinion, such a service is desirable. Of course, probably New York or Chicago companies will not be particularly interested, but throughout the whole country I think there would be a general interest. Would it be an attractive proposition for you? Would it be a service that you think would be appreciated?

G. A. ALLEN.—I think it would. But could the small companies afford to undertake it? If the service was sent out at a reasonable rate, I have no doubt a great many companies would use it. Not many at first perhaps, but later I think they would all come in. The newspaper syndicates carry on similar work; and most of the department stores send to a Special Cut Service Bureau for cuts they want for any special week of sales. Of course, it would not pay them to get up the designs and the cuts themselves, when they can buy for 75 cents one that would cost them $7 or $8 to make. That is where it would pay, especially with companies having no advertising department and where the manager himself has not the time to give to the work. I think we would all want the service, so long as it did not get back to the old type of syndicate advertising where a page or half column of printed matter was sent out to run for a whole season. But if it was made by gas men for gas men I think it would pay.

MR. GERLICH.—The Hot Point Electric Company is now distributing to all the electrical companies in the United States, a sort of home book on the use of electrical appliances. Perhaps something of this sort could be initiated; we might imitate that book to a certain extent, and get out a home book on the use of gas and gas lighting appliances.

H. G. REED.—I would like very much to get this window advertising and newspaper service; and I think there would be enough small companies interested to maintain a service and reimburse the Association for doing the work.

THE CHAIRMAN.—This does not mean any definite payment per year. This material will be sent out, and you can pick out such parts of it as you choose, paying only for the material you select. It does not mean a subscription like National Advertising. National advertising is only postponed, we hope, for a year.

J. P. HANLAN.—I believe that there is need for this, particularly in view of the fact that the advertising activity of the N. C. G. A. is limited this year. Such advertising service will be different from the average syndicate advertising.

If this service is fathered by the Association and accompanied by good cuts and illustrations, we will get practical good out of it. There would be no text matter, although if copy is desired no doubt it will be suggested. I know what an immense amount of detail is involved in getting out the proper kind of advertising. I do not see how a man who has not had the opportunity and the

time to train himself for it can possibly do intelligent advertising. I think this service would be a success.

L. R. DUTTON.—Our company has little opportunity to use advertising cuts. We have an advertising department of our own, and for years have welcomed just such a service as this. We use to advantage advertising cuts secured from syndicates and sometimes from the Association. I think this would be a great service to the companies that do not maintain advertising departments.

The Relation Between Production and Costs.

Paper by H. L. GANTT, read before the American Society of Mechanical Engineers.

Manufacturers in general recognize the vital importance of a knowledge of the cost of their product, yet but few of them have a cost system on which they are willing to rely under all conditions.

2. While it is possible to get quite accurately the amount of material and labor used directly in the production of an article, and several systems have been devised which accomplish this result, there does not yet seem to have been devised any system of distributing that portion of the expense known variously as indirect expense, burden or overhead, in such a manner as to make us have any real confidence that it has been done properly.

3. There are in common use several methods of distributing this expense. One is to distribute the total indirect expense, including interest, taxes, insurance, etc., according to the direct labor. Another is to distribute a portion of this expense according to direct labor, and a portion according to machine hours. Other methods distribute a certain amount of this expense on the material used, etc. Most of these methods contemplate the distribution of *all* of the indirect expense of the manufacturing plant, however much it may be, on the output produced, no matter how small it is.

4. If the factory is running at its full, or normal, capacity, this item of indirect expense per unit of product is usually small. If the factory is running at only a fraction of its capacity, say one-half, and turning out only one-half of its normal product, there is but little change in the total amount of this indirect expense, all of which must now be distributed over half as much product as previously, each unit of product thereby being obliged to bear approximately twice as much expense as previously.

5. When times are good, and there is plenty of business, this method of accounting indicates that our costs are low; but when times become bad and business is slack, it indicates high costs due to the increased proportion of burden each unit has to bear. During good times, when there is a demand for all the product we can make, it is usually sold at a high price and the element of cost is not such an important factor. When business is dull, however, we cannot get such a high price for our product, and the question of how low a price we can afford to sell the product is of vital importance. Our cost systems, as generally operated at present, show under such conditions that our costs are high and, if business is very bad they usually show us a cost far greater than the amount we can get for the goods. In other words, our present systems of cost accounting go to pieces when they are most needed. This being the case, many of us have felt, for a long time, that there was something radically wrong with the present theories on the subject.

6. As an illustration, I may cite a case which recently came to my attention. A man found that his cost on a certain article was 30 cents. When he found that he could buy it for 26 cents, he gave orders to stop manufacturing and to buy it, saying he did not understand how his competitor could sell at that price. He seemed to realize that there was a flaw somewhere, but he could not locate it. I then asked him what his expense consisted of. His reply was labor 10 cents, material 8 cents and overhead 12 cents. My next question was: Are you runningy our factory at full capacity? I got the reply that he was running it at less than half its capacity, possibly at one-third. The next question was: What would be the overhead on this article if your factory were runnlng full? The reply was that it would be about 5 cents; hence the cost would be only 23 cents.

7. The possibility that his competitor was running his factory full suggested itself at once as an explanation.

8. The next question that suggested itself was how the 12 cents overhead, which was charged to this article, would be paid if the article was bought. The obvious answer was that it would have to be distributed over the product still being made, and would thereby increase its cost. In such a case it would probably be found that some other article was costing more than it could be bought for; and, if the same policy were pursued, the second article should be bought, which would cause the remaining product to bear a still higher expense rate.

9. If this policy were carried to its logical conclusion, the manufacturer would be buying everything before long, and be obliged to give up manufacturing entirely.

10. The illustration which I have cited is not an isolated case, but is representative of the problems before a large class of manufacturers, who believe that *all of the expense, however large, must be carried by the output produced, however small.*

11. This theory of expense distribution is quite widespread, and clearly indicates a policy, which in dull times would, if followed logically, put many of our manufacturers out of business. In 1897 the plant of which I was superintendent, was put out of business by just this kind of logic. It never started up again.

12. Fortunately for the country, American people as a whole will finally discard theories which conflict with common sense; and, when their cost figures indicate an absurd conclusion, most of them will repudiate the figures. A cost system, however, which fails us when we need it most, is of but little value, and it is imperative for us to devise a theory of costs that will not fail us.

13. Most of the cost systems in use, and the theories on which they are based, have been devised by accountants for the benefit of financiers, whose aim has been to criticize the factory and to make it responsible for all the shortcomings of the business. In this they have succeeded admirably, largely because *methods used are not so devised as to enable the superintendent to present his side of the case.*

14. Our theory of cost keeping is that *one of its prime functions is to enable the superintendent to know whether, or not, he is doiny the work he is responsible for as economically as possible,* which function is ignored in the majority of the cost systems now in general use. Many accountants, who make an attempt to show it, are so long in getting their figures in shape that they are practically worthless for the purpose intended, the possibility of using them having passed.

15. In order to get a correct view of the subject we must look at the matter from a different and broader standpoint. The following illustration seems to put the subject in its true light:

16. Let us suppose that a manufacturer owns three identical plants, of an economical operating size, manufacturing the same article—one located in Albany, one in Buffalo and one in Chicago—and that they are all running at their normal capacity and managed equally well. The amount of indirect expense per unit of product would be substantially the same in each of those factories, as would be the total cost. Now suppose that business suddenly falls off to one-third of its previous amount and that the manufacturer shuts down the plants in Albany and Buffalo, and continues to run the one in Chicago exactly as it has been run before. The product from the Chicago plant would have the same cost that it previously had, but the expense of carrying two idle factories might be so great as to take all the profits out of the business; in other words, the profit made from the Chicago plant might be offset entirely by the loss made by the Albany and Buffalo plants.

17. If these plants, instead of being in different cities, were located in the same city, a similar condition might also exist in which the expense of the two idle plants would be such a drain on the business that they would offset the profit made in the going plant.

18. Instead of considering these three factories to be in different parts of one city, they might be considered as being within the same yard, which would not change the conditions. Finally, we might consider that the walls between these factories were taken down and that the three factories were turned into one plant, the output of which had been reduced to one-third of its normal volume. Arguing as before it would be proper to charge to this product only one-third of the indirect expense charged when the factory was running full.

19. If the above argument is correct, we may state the following general principle; The indirect expense chargeable to the output of a factory bears the same ratio to the indirect expense necessary to run the factory at normal capacity, as the output in question bears to the normal output of the factory.

20. This theory of expense distribution, which was forced upon us by the abrupt change in conditions brought on by the war, explains many things which were inexplicable under the older theory, and gives the manufacturer uniform costs as long as the methods of manufacture do not change.

21. Under this method of distributing expense there will be a certain amount of undistributed expense remaining whenever the factory runs below its normal capacity, A careful consideration of this item will show that it is not chargeable to the product made, but is a business expense incurred on account of our maintaining a certain portion of the factory idle, and chargeable to profit and and loss. Many manufacturers have made money in a small plant, then built a large plant and lost money for years afterwards, without quite understanding how it happened. This method of figuring gives a clear explanation of that fact and warns us to do *everything possible to increase the efficiency of the plant we have, rather than to increase its size.*

22. The theory seems to give a satisfactory answer to all the questions of cost that I have been able to apply it to, and during the past few months I have laid it before a great many capable business men and accountants. Some admitted that this viewpoint would produce a very radical change in their business policy, and are already preparing to carry out the new policy.

23. It explains clearly why some of our large combinations of manufacturing plants have not been as successful as was anticipated, and why the small, but newer plant, is able to compete successfully and make money, while the combinations are only just holding their own.

24. The idea so prevalent a few years ago, that in the industrial world money is the most powerful factor, and that if we only had enough money, nothing else would matter very much, is beginning to lose its force, for it is becoming clear that *the size of a business is not so important as the policy by which it is directed.* If we base our policy on the idea that the cost of an article can only legitimately include the expense necessarily incurred either directly or indirectly in producing it, we shall find that our costs are much lower than we thought, and that we can do many things which under the old method of figuring appeared suicidal.

25. The view of costs so largely held, namely; that *the product of a factory, however small, must bear the total expense, however large,* is responsible for much of the confusion about costs, and hence leads to unsound business policies.

26. If we accept the view that the article produced shall bear only that portion of the indirect expense needed to produce it, our costs will not only become lower, but relatively far more constant, for the most variable factor in the cost of an article under the usual system of accounting has been the "overhead," which has varied almost inversely as the amount of the product. This item becomes substantially constant if the "overhead" is figured on the normal capacity of the plant.

27. Of course a method of accounting does not diminish the expense, but it may show us where the expense properly belongs, and give us a more correct understanding of our business.

28. In our illustration of the three factories, the cost in the Chicago factory remained constant, but the expense of supporting the Buffalo and Albany factories in idleness was a charge against the business, and properly chargeable to profit and loss.

29. If we had loaded this expense on the product of the Chicago factory, the cost of the product would probably have been so great as to have prevented our selling it, and the total loss would have been greater still.

30. When the factories are distinctly separate, few people make such a mistake, but where a single factory is three times as large as is needed for the output, the error is frequently made, with results that are just as misleading.

31. *As a matter of fact, it seems that the attempt to make a product bear the expense of plant not needed for its production, is one of the most serious defects in our industrial system today, and farther reaching than the differences between employers and employees.*

32. The problem that faces us is then, first to find just what plant, or part of a plant, is needed to produce a given output, and to determine the "overhead" expense in operating that plant or portion of a plant. This is primarily the work of the manufacturer, or engineer, and only secondarily that of the accountant, who must, as far as costs are concerned, be the servant of the superintendent.

33. In the past, in almost all cost systems the amount of "overhead" to be charged to the product, when it did not include *all* the "overhead," was more or less a matter of judgment. According to the theory now presented, it is not a matter of judgment, but can be determined with an accuracy depending upon the knowledge the manufacturer has of the business.

34. Following this line of thought it should be possible for a manufacturer to calculate just what plant and equipment he ought to have, and what the staff of officers and workmen should be to turn out a given profit.

35. If this can be correctly done, the exact cost of a product can be predicted. Such a problem cannot be solved by a cost accountant of the usual type, but is primarily a problem for an engineer, whose knowledge of materials and processes is essential for its solution.

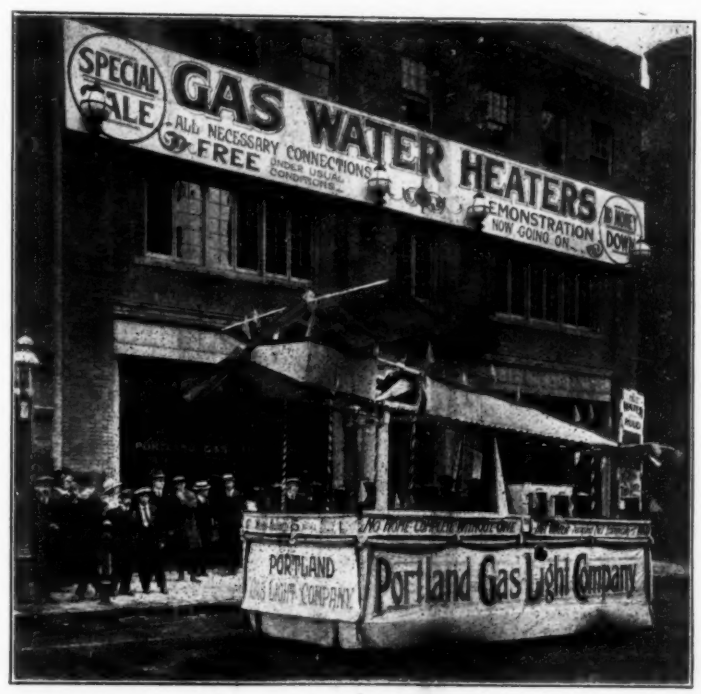
36. Having made an attempt to solve a problem of this type, one of the most important functions we need a cost system to perform, is to keep the superintendent continually advised as to how nearly he is realizing the ideal set, and to point out where the shortcomings are.

37. Many of us are accustomed to this view point when we are treating individual operations singly, but few have as yet made an attempt to consider that this idea might be applied to a plant as a whole, except when the processes of manufacture are simple and the products few in number. When, however, the processes become numerous or complicated, the necessity for such a check becomes more urgent, and the cost keeper who performs this function becomes an integral part of the manufacturing system, and acts for the superintendent, as an inspector, who keeps him advised at all times of the quality of his own work.

38. This conception of the duties of a cost keeper does not at all interfere with his supplying the financier with the information he needs, but insures that information shall be correct, for the cost keeper is continually making a comparison for the benefit of the superintendent, of what has been done with what should have been done. Costs are valuable only as comparisons, and comparisons are of little value unless we have a standard, which it is the function of the engineer to set.

39. Lack of reliable cost methods has, in the past, been responsible for much of the uncertainty so prevalent in our industrial policies; but with a definite and reliable cost method, which enables us to differentiate between what is lost in manufacturing and what is lost in business, it will usually become easy to define clearly the proper business policy.

Campaigning Water Heaters.



In connection with a campaign on tank water heaters, the Portland (Me.) Gas Light Company had this display in the 4th of July parade, and received a silver cup for "one of the most suitably decorated floats." The photograph also shows the water heater sign across the face of their very attractive new office building. They are advertising quite extensively in the newspapers, and in the theatre programs, etc., and are getting encouraging returns. They have every reason to expect that they will put out nearly a thousand heaters to add to the 1,800 already on their lines.

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NEW YORK, MONDAY, JULY 26, 1915.

Power of Commission to Increase Rates Limited.

By refusing to permit the Ulster & Delaware Railroad to increase its mileage book rate from two to three cents a mile the upstate New York Public Service Commission made one of the most important statements of principle since the passage of the Public Service Commission Law in 1907. The majority of the Commisson holds that, notwithstanding the broad rate making powers granted it, it has not the power to permit a rate to be increased above a maximun set by the Legislature.

Chairman Van Santvoord, in the prevailing opinion, points out should the Commission assume that the power to permit such increases had been delegated to it by the Public Service Commissions Law, not only the mileage book law involved in the present case, but such other statutes as the three cent maximum fare law, the eighty cent gas law for New York City, and other similar enactments might be, in effect, repealed by the Commission's decisions. In an extended review of all the statutory sections involved he fails to find that the Commission, either expressly or impliedly, has been granted such power.

Commissioner Emmet and Commissioner Carr dissented. Mr. Emmet holds that had not the Legislature intended to take the rate making power out of the "often bungling" hands of the Legislature and placed it absolutely in the jurisdiction of the Commission, the whole battle of Governor Hughes for the regulation of public utilities would have been vain. As the power to lower rates irrespective of legislative enactment is expressly granted in the Public Service Commissions Law, he holds that the power to raise rates is implied beyond reasonable doubt. Were the power to raise rates to afford a reasonable return on investment, in accordance with the facts disclosed in each case, not implied, the intent of the legislature that passed the law would have been anything but the distribution of even-handed justice to the companies as well as to the public.

The direct question as to whether the Commission has the power to raise rates in contravention of older statutes has never been raised in New York before, and the decision of the Commission will undoubtedly be carried to the court of last resort for final determination.

The Supreme Court of Missouri, quoted in the opinion of Commissioner Carr, held that the Public Utility Commission of that State, by a statute delegating to it the rate making power in the same words as does the Hughes law, was empowered to set aside the two-cent fare law of that state. He holds that the "mileage book law" of this state is in effect but a legislative guide for the railroads which come under it until the rate that it prescribes can be passed upon by the Commission.

The mileage book law was passed in 1895 and the Commission holds that it was not repealed when the Public Service Commissions Law was enacted in 1907. On the contrary it is pointed out that when the consolidated laws were enacted in 1910 the Public Service Commissions Law was made Chapter 48 of the Consolidated Laws and the Mileage Book Law, in its then precise form, was made Chapter 49, the Chapter numbers at least indicating the the mileage book law re-enacted thus subsequently to the Public Service Commissions Law, specifically escaped the effect of the clause in the Public Service Commissions Law repealing all other statutes contrary to itself.

The Mileage Book Law provides that wherever a railroad over one hundred miles in length sells regular tickets for more than two cents a mile up to the legal maximum of three cents a mile, it must sell a mileage book at two cents a mile. The Ulster & Delaware pleaded that this was not a rate by which it could earn a fair return and asked permission to increase the rate to three cents a mile, under the general rate making powers of the Commission. While the majority opinion seems to concur with the dissenting one in that a company, on a basis of fair return, is entitled to an increase, and admits that in such a case the Commission has a power to grant an increase, it holds that this power to increase does not extend to increases above a statutory maximum.

Upon the question of the legislature's right to go over the heads of the Commissions and fix rates for public utility corporations, Mr. Emmet points out that every Governor since 1907 has vetoed such rate bills when they were passed, holding that the intent of the Public Service Commissions Law was that all rates should be fixed by the Commission.

Illuminating Engineering Society Convention.

Following is the preliminary program of the ninth annual convention of the Illuminating Engineering Society at the New Willard Hotel, Washington, D. C., September 20–23, inclusive. The papers promise to be of an unusually high standard, and are distributed over ten sessions. One session will be devoted especially to the subject of street lighting; commercial, general, and laboratory papers will be given three sessions each. Inspection trips, a reception, and a banquet are among the entertainment features.

Sept. 20—Morning.

Formal opening of convention.

Address of Welcome; President's Address, etc.

Report of Committees on Lighting Legislation, Nomenclature and Standards, and Progress.

Afternoon—General Session.

"Tests and Experiments in Connection with the New Commonwealth Edison Company Building," by W. A. Durgin and J. P. Jackson.

"Ship Lighting," by H. A. Horner.

"Illumination Efficiency as Obtained in an Experimental Room," by Ward Harrison.

Evening—Reception.

Sept.21—Morning—General Session.

"Photometry with Portable Instruments," by W. F. Little.

"New Test Plate for Illumination Photometers," by C. H. Sharp.

"Incandescent Lamp Testing and Photometry," by G. W. Middlekauff.

"Street Lighting," by F. A. Vaughn.

Afternoon—Entertainment; trips.

Evening—Street Lighting Session.

"Gas Street Lighting." (Author not yet announced.)

"Arc Lamps for Street Illumination," by H. E. Clifford.

"New Types of Incandescent Lamps and Their Relations to the Street Lighting Problems," by W. H. Rolinson.

"Ornamental Street Lighting," by T. I. Jones.

Sept. 22—Morning—Commercial Session.

"How to Attack a Lighting Problem," by W. R. Moulton.

"How Can a Combination Gas and Electric Company Render the Best Service to Customers," by S. B. Burrows and N. H. Potter.

"Small Incandescent Lamps and Special Illumination Problems," by R. P. Burrows.

"Lighting of Office Buildings," by A. O. Dicker.

Laboratory Session.

"Crova's Method of Colored Light Photometry Applied to Modern Incandescent Illuminents," by H. E. Ives and E. F. Kingsbury.

"Differences in Threshold and Acuity Variations," by P. W. Cobb.

"Visual Efficiency," by Messrs. Richtmyer and Howes.

"Yellow Screens," by M. Luckiesh.

AFTERNOON—Commercial Session.

"The Flame Pilot Ignition of Incandescent Gas Lamps," by C. W. Jordan.

"Practical Illumination as Exemplified by Some Recent Installations of Incandescent Gas Lamps," by R. ff. Pierce.

"Mercury Arc Lamps for Industrial Lighting," by W. A. D. Evans.

"Relation Between Proper Illumination and Accident Prevention," by R. E. Simpson.

Laboratory Session.

"Retinal Sensibilities in Relation to Illuminating Engineering," by P. G. Nutting.

"The Effect of Distribution of Light on Muscular Control," by H. M. Johnson.

"Effect of Various Wave Lengths of Radiation on Eye Cataract," by W. E. Berge.

Sept. 23—MORNING—Commercial Session.

"Artificial Illumination of Interiors," by David Crownfield.

"Lighting of State, War and Navy Buildings," by W. E. Chapman.

"Lighting of Gymnasiums and Armories with Incandescent Lamps," by A. L. Powell and A. B. Oday.

Laboratory Session.

"The Effect of Surrounding Gas on an Incandescent Filament," by C. F. Lorenz.

"The Parabolic Mirror," by F. A. Benford, Jr.

A paper (subject to be announced later), by C. E. Ferree.

AFTERNOON—General Session.

"Artificial Illumination in Practical Photography," by C. E. K. Mees.

"Photographic and Visual Illumination Efficiencies," by L. A. Jones.

"Production and Application of Ultra Violet Light," by M. Von Recklinghausen.

"A Flux Method of Obtaining Average Illumination," by F. A. Benford and H. E. Mahan.

JULY MEETING N. C. G. A. BOARD OF DIRECTORS.

The regular July meeting of the Board of Directors, National Commercial Gas Association, was held at the Annex Hotel, Chicago, Ill., the 9th inst. There were present: H. B. McLean, President; T. M. Ambler, T. R. Elcock, Jr., B. J. Kellum, J. B. Myers, P. S. Young and Louis Stotz; and by invitation, Messrs. Geo. D. Roper and C. L. Holman.

Mr. Elcock reported that he was in correspondence with Mr. Babcock at San Francisco with regard to proper publicity covering the uses for gas at the Panama-Pacific Exposition.

Mr. Kellum stated that the Advisory Committee on Exhibitions was working on plans to finance future exhibitions; and after a lengthy discussion, it was suggested that in 1916 there be an exhibition of a quality to attract the public and cover live working exhibits using gas. Also that the interests of trades using gas should be enlisted, so that they might manufacture their products with it, and that these recommendations be presented to the Advisory Committee on Exhibitions for their consideration.

It was reported that a committee had been appointed to work out plans covering a window-dressing service for gas companies, including the employment of a window-dressing expert, the expense for this service to be defrayed by a regular annual assessment on the companies. This matter was left in the hands of the committee with instructions that they present their recommendations when the plans are completed.

It was decided to hold a National Lighting Week, September 27th to October 2d; and Mr. Elcock stated that he had appointed a committee to work out definite plans to be submitted to gas companies to enlist their interest in the campaign.

Mr. Young reported that a committee had met in his office and tentatively reviewed the papers thus far sent in for presentation at the Gas Congress as the N. C. G. A. contribution to the program. The papers would be carefully gone over, edited, and then turned over to the Gas Congress Paper Committee.

The President reported that he had a letter from the Chairman of the Central Development Committee outlining a plan for the N. C. G. A. to keep in close touch with legislative enactments and municipal ordinances detrimental to the interests of the gas industry. It was decided to refer the question to the Public Policy Committee for consideration.

The President presented a letter from O. H. Fogg that outlined a suggestion to establish a Promotive Lecture Bureau. This brought about quite a discussion and it was thought that the plan would be advantageous, but that the Association was not in position at present to finance such a proposition.

This discussion led to the question of the advisability of employing experts in different lines to be associated with the N. C. G. A. permanent staff. It was suggested that there should be an industrial fuel expert, an illuminating engineer and a publicity expert. It was decided that the Association should start such service to gas companies, by engaging an industrial fuel expert, the selection of a man to be left to a committee of three appointed by the President. The Secretary was requested to take up the matter of the interchange of speakers for Local Sections with the Local Sections Committee. Mr. J. B. Myers, on behalf of the Chairman of the Committee for Reciprocal Relations with Other Associations, reported a meeting of that committee at the Mid-Year Conference, covering the subject of closer relations with architects, builders, operators and plumbers, and the matter of closer relations with the American Gas Institute and other Associations.

The Chairman of the National Advertising Committee reported that he had prepared a letter to be sent to subscribers to the Fund, with a statement of the receipts and expenses, and a schedule showing the space taken in the various magazines.

The Secretary presented a report of the meeting of the Paper Committee, which outlined the program for the Washington Convention.

[OFFICIAL NOTICE.]

Pacific Coast Gas Association.

OFFICE OF THE SECRETARY, 445 SUTTER STREET,
SAN FRANCISCO, July 15th, 1915.

The International Gas Congress holding its Convention in San Francisco beginning September 27th, 1915, will render unnecessary the usual Annual Convention of the Pacific Coast Gas Association, except for the election of officers and routine business.

In order that the members of the Pacific Coast Gas Association may have the advantage of membership in the International Gas Congress, the following resolution was adopted by the Board of Directors of the Association at a meeting on June 15th, 1915;

"In order that the members of the Pacific Coast Gas Association may have the advantage of membership in the International Gas Congress, it is hereby

"*Resolved*, That all members in good standing in the Association as of September 1st, 1915, become members of the International Gas Congress, and as such shall be entitled to all the privileges of the convention of that body and also the bound volume of its proceedings. This refers to members who have paid their dues for the current fiscal year 1915–6, and any delinquency of previous years.

"*Resolved*, That the Secretary of the Pacific Coast Gas Association is hereby directed to register all members of the Association as members of the International Gas Congress, and make remittance to the International Gas Congress of the $5 registration fee covering its members."

It is the purpose of the Association to register as members of the International Gas Congress all members of the Pacific Coast Gas Association who have paid their dues in full, on or before September 1st, 1915; and to remit the amount so obtained as payment of dues to the Congress. It is, therefore, essential that remittance be made to the undersigned, of the amount; and it is hoped, for the credit of the Pacific Coast Gas Association, that remittance will be made prior to September 1st, 1915, in order that a large enrollment of members of the Association may be made in the ranks of the International Gas Congress.

Members who may not be able to attend the Congress, but whose dues have been paid, will be registered, and convention badge and volume of proceeding will be sent them.

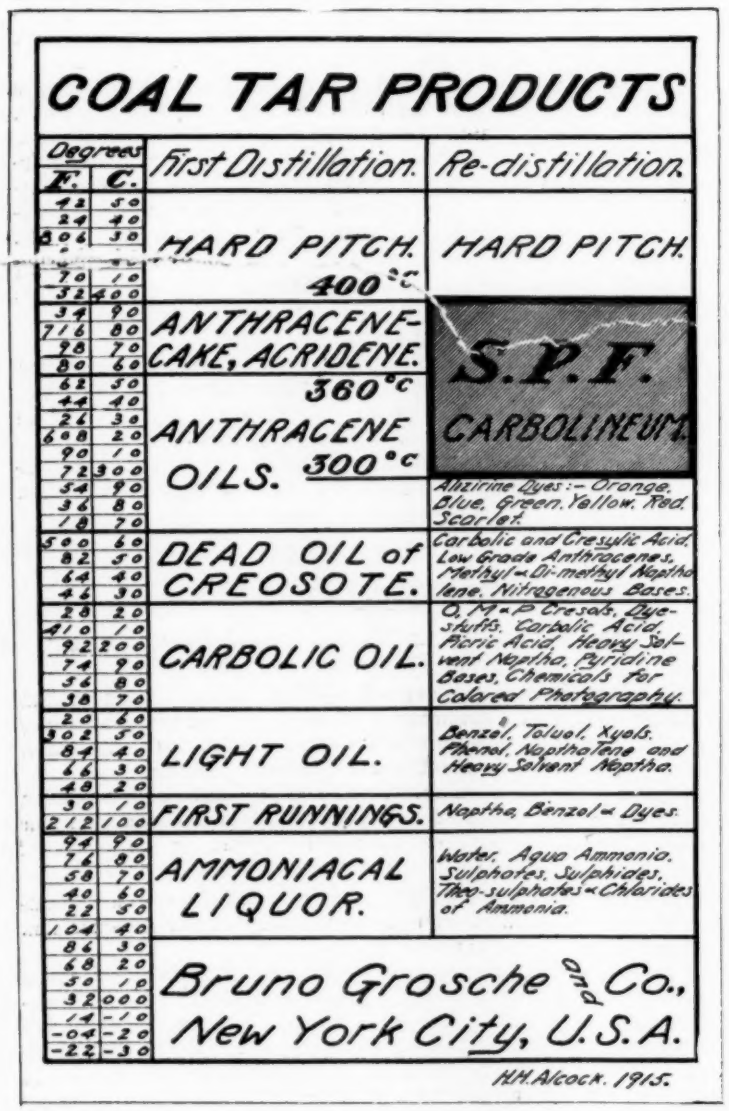
Prompt remittance, therefore, upon the part of all members will be duly appreciated, and will materially assist this office in the work of registration of members. HENRY BOSTWICK. Secretary.

Carbolineum and Creosote.

By H. H. Alcock.

Primarily, the difference between Creosote and Carbolineum is the temperature at which, in the fractional distillation of coal tar, they occur, being 500° and 600° respectively.

The attached chart, "Coal Tar Products," give an excellent idea of the temperature at which separate and known products of coal tar are given off. Anyone of these distillates can be redistilled, and any one product of any group separated, the balance being bi-products. Understanding this, you will see that every manufacturer of any distillate of coal tar will have no use for many of the others; and also that after every distillation there is a residue.


COAL TAR PRODUCTS
Degrees F. C.
First Distillation.
Re-distillation.
HARD PITCH. 400°C
HARD PITCH.
ANTHRACENE-CAKE, ACRIDENE.
S.P.F. CARBOLINEUM.
360°C
ANTHRACENE OILS. 300°C
Alizirine Dyes:- Orange, Blue, Green, Yellow, Red, Scarlet.
DEAD OIL of CREOSOTE.
Carbolic and Cresylic Acid, Low Grade Anthracenes, Methyl-Di-methyl Naphthalene, Nitrogenous Bases.
CARBOLIC OIL.
O. M. & P. Cresols, Dye-stuffs, Carbolic Acid, Picric Acid, Heavy Solvent Naptha, Pyridine Bases, Chemicals for Colored Photography.
LIGHT OIL.
Benzol, Toluol, Xyols, Phenol, Naphthalene and Heavy Solvent Naptha.
FIRST RUNNINGS.
Naptha, Benzol = Dyes.
AMMONIACAL LIQUOR.
Water, Aqua Ammonia, Sulphates, Sulphides, Thio-sulphates = Chlorides of Ammonia.
Bruno Grosche and Co., New York City, U.S.A.
H.H. Alcock. 1915.

The particular product coming off at about 370° is known as carbolic, oil and is a poisonous base used in the manufacture of many poisonous compounds. At 500°, we get the creosote, or dead oil, which is also a poisonous compound, injurious to many forms of material and particulary to wood. Real creosote is seldom obtained, and the word "creosote" has become more or less an inaccurate term—something made of coal tar is the general meaning applied. Every rendering works has a well into which they dump the tail runnings and residue of the particular distillate of coal tar that they are using, and this well is known as the "creosote well." This combined mixture—or what might be termed the refuse of many processes—is sold to the unsuspecting buyer, who has neither the time, nor inclination, nor apparatus to make the necessary analysis and investigation. There are many standard works on coal tar products dealing with the higher and technical side of the question, all of which, however, are more or less unintelligible to anyone except an experienced chemist.

Chemically and physically, the above is the difference between Creosote and Carbolineum. In their action, as far as the prevention of dry rot and decay of wood is concerned, the difference can be told very quickly. Creosote treatment frequently results in premature destruction of wood, and any dilution of creosote is more or less destructive in action. Carbolineum preserves wood; it has no destructive action upon wood or metal.

The U. S. Forestry Department has gone fully into the subject of wood preservation, and has published a number of bulletins on the subject, their object being to investigate the merits of a proposition that would seem to be superior to creosote, both in efficiency and lower cost.

There is no question as to what creosote treatment does to wood fibre. Engineers are beginning to realize that, after spending large sums of money in efforts to secure proper wood preservation by means of cresote, they have been worshipping a false god. A creosote plant means the investment of many thousands of dollars and the employment of considerable labor, with an oil of low cost. A Carbolineum plant is diametrically opposite in every respect. The oil is the most expensive part of it, and the plant and labor, with the exception of the one man with the "know how," are the smallest items.

The first step in the treatment of wood is to have it perfectly dry and seasoned, which is not always possible unless one is prepared to buy and store a large stock of wood for several years. Consequently, the question of treating timber that is wet and more or less green, is the problem the wood preserver has to face. If creosote is used, the creosote man has to remove some of the water in the wood before he can impregnate with creosote. He then forces the specified quantity of creosote in the wood, which actually seals the wood up, leaving the moisture inside ready and willing to start the work of destruction there. If Carbolineum is employed, and the same class and quality of wood relative to water is to be used, the Carbolineum man finds it necessary to remove some of the water in order to let Carbolineum get its start, but as Carbolineum *does not close the pores of the wood, an interchange of Carbolineum and moisture in the inside of the piece of timber is constantly taking place*, and every wood cell will be thoroughly lined and coated with a film of oil which never dries, never solidifies, never evaporates. The method used is described in all forestry publications, under the head of "Open Tank Treatment."

The physical difference between the two plants is marked. In some cases, with creosote, the timber is heated in lumber kilns, and then packed in large cylinders which are closed up and again heated with steam at high pressure. The tanks are then filled with creosote kept hot by interior steam coils, and pressure is put upon the cylinders until the specifications of the engineer are supposed to have been complied with. During the process, the wood is constantly subjected to heat, which is increased with every step of the treatment, and if steam pressure of 125 pounds is used, the wood is cooked at a temperature of nearly 350°, which by itself has an injurious effect on the albumen and starch of the wood fibre. The wood is not only heated to this dangerous point, but it must remain at this temperature during a period (varying with the amount of creosote to be impregnated) of from 12 to 36 hours. After this operation is completed, it is just a question whether the job is done or not.

The comparison of any proposition—whether it be a method or material—is useless unless some known and familiar standard is used. Consequently, we have used creosote as the yard stick for measuring carbolineum, and to one who may not be familiar with all the details it might seem that we had nothing good to say for creosote. Creosote in its sphere has its merits, and at the present time, is the only satisfactory method of treating piles against the teredo of the Pacific Coast, the largest and most voracious of these marine pests. But even at that, it will not entirely prevent the attacks, and at best a treated pile will last but 6 or 7 years.

One point that should have been made very clear is the selfimpregnating feature of carbolineum treatment. By this we mean the continued absorption of the oil applied, affecting not only the surface, but all the fibre. This is not a theory. The samples of wood examined were not test pieces, but railroad ties and other forms of material that had been in actual service, and show upon examination, after varying lengths of time, that the outside surface of the wood is dry and the oil has continued into the very centre of the piece.

Again making our creosote comparison. Creosote only goes as far as it is mechanically pushed, and the minute the pressure is releaved and the material taken out of the retort, the "black oil of creosote" stops penetrating the wood, and it is the custom of engineers in writing creosote specifications to not only stipulate the number of pounds of oil per cubic foot to be used, but also to state the oil shall show an initial penetration of certain depth. It is true, however, that the more volatile constituents of the creosote will impregnate the wood very rapidly upon application, but they are mostly composed of tar acids, which are not only valueless as wood preservatives, but injurious to the fibre.

Wood treated with carbolineum will, in time, show a tensile and compressive strength greater than the seasoned or partially seasoned wood; and its holding power for spikes is greater than untreated wood, and, further, the spikes will not rust in a Carbolineum-treated tie. Carbolineum-treated ties, after several years of service, show comparatively no mechanical wear from the rails. Again making the comparison with creosote: While the life of a creosoted tie is greater than that of an untreated piece of timber, it will show a loss of tensile and compressive strength amounting to thirty per centum, and the outside of the wood, to the depth of the initial penetration is a mass of charcoal. The spike in such a tie has a "moment arm" between the bottom of the rail and the unaffected wood that very effectually and quickly enlarges the spike hole, and within two or three years it is quite possible to remove the spikes from a creosoted tie with the fingers; whereas, with a carbolined tie, it is not unusual to pull the head of the spikes off with a claw bar when attempting to remove them.

Another feature of carborlineum is that vermin will not attack carbolineum treated wood. Lumber so treated, when put in salt water, will be absolutely free from barnacles.

1914 Oil Product.

The production of petroleum in the United States in 1914 aggrated 290,212,535 barrels. The following table shows by States and principal fields the distribution of the marketed production, including fuel oil consumed in field operations; and the corresponding data for 1913. Producers' storage, particularly in Oklahoma and California, attained proportions so great, and exercised so marked an effect on the industry that data on this have been included as an index of market fluctuations.

The marketed production shows an increase of 17,316,305 barrels, nearly 7% over the corresponding production in 1913.

The average price per barrel received was $0.806 in 1914 as compared with $0.954 in 1913, and the total value of the marketed oil, $214,125,215, a loss of $23,006,173 compared with the previous year.

No important changes were made in the rank of the oil-producing States in 1914, through the enormous output of the Cushing pool in Oklahoma made that State a strong contender for first place, which was, however, retained by California by about 10,000,000 barrels. Wyoming showed the greatest relative increase in production, exceeding its record output of 1913 by nearly 48%, though failing to gain rank above ninth. The greatest relative decline was in West Virginia, which recorded a decrease of 16%.

Marketed Production of Petroleum in the United States in 1913 and 1914.

State or Region.	1913.			1914.			Increase (+) or decrease (—)		Per cent increase or decrease.	
	Quantity (barrels.)	Value.	Average per barrel.	Quantity.	Value.	Average per barrel.	Quantity.	Value.	Quantity	Value.
California	97,788,525	$45,709,400	$0.467	99,775,327	$48,066,096	$0.482	+ 1,986,802	+ $2,356,696	+ 2.03	+ $5.16
Colorado	188,799	174,779	.926	222,773	200,894	.902	+ 33,974	+ 26,115	+ 17.99	+ 14.94
Illinois	23,893,899	30,971,910	1.296	21,919,749	25,426,179	1.160	— 1,974,150	— 5,545,731	— 8.26	— 17.91
Indiana	956,095	1,279,226	1.337	1,335,456	1,548,042	1.159	+ 379,361	+ 268,816	+ 39.68	+ 21.01
Kansas	2,375,029	2,248.283	.948	3,103,585	2,433,074	.784	+ 728,556	+ 184,791	+ 30.68	+ 8.22
Kentucky	524,568	675,748	1.288	502,441	498,556	.992	— 22,127	— 177,192	— 4.22	— 26.22
Louisiana:										
Northern	9,781,560	9,812,342	1.003	11,808,469	11,206,686	.949	+ 2,026,909	+ 1,394.344	+ 20.72	+ 14.21
Coastal	2,717.268	2,443,589	.899	2,500,966	1,680,211	.672	— 216,302	— 763,378	— 7.96	— 31.24
Total Louisiana	12,498,828	12,255,931	.951	14,309,435	12,886,897	.901	+ 1,810,607	+ 630,966	+ 14.49	+ 5.15
New York	948,191	2,284,307	2.409	938,974	1;760,868	1.875	— 9,217	— 523,439	— .97	— 22.91
Ohio:										
Southeastern	4,964,425	12,229,610	2.463	4,809,265	8,937,415	1.858	— 155,160	— 3,292,195	— 3.13	— 26.92
Lima	3,817,043	5,308,842	1.391	3,727,087	4,435,314	1.190	— 89,956	— 873,528	— 2.36	— 16.45
Total Ohio	8,781,468	17,538,452	1.997	8,536,352	13,372,729	1,567	— 245,116	— 4,165,723	— 2.79	— 23.75
Oklahoma	63,579,384	59,581,948	.937	73,631,724	57,253,187	.778	+ 10,052,340	— 2,328,761	+ 15.81	— 3.91
Pennsylvania	7,917,302	19,690,502	2.487	8,170,335	15,573,822	1.906	+ 253,033	— 4,116,680	+ 3.20	— 20.91
Texas:										
Northern	9,184,252	9,125,185	.994	9,451,622	7,778,955	.823	+ 267,370	— 1,346,230	+ 2.91	— 14.75
Coastal	5,825,226	5,550,408	.953	10,616,562	7,163,893	.675	+ 4,791,336	+ 1,613,485	+ 82.25	+ 29.07
Total Texas	15,009,478	14,675,593	.978	20,068,184	14,942,848	.745	+ 5,058,706	+ 267,255	+ 33.70	+ 1.82
West Virginia	11,567,299	28,828,814	2.492	9,680,033	18,468,540	1.908	— 1,887,266	— 10,360,274	— 16.32	— 35.93
Wyoming	2,406,522	1,187,232	.493	3,560,375	1,679,192	.472	+ 1,153,853	+ 491,960	+ 47.95	+ 41.44
Other	*b*10,843	*b*19,263	1.777	*c*7,792	*c*14,291	1.834	— 3,051	— 4,972	— 28.14	— 25.81
Total	248,446,230	237,121,388	.954	265,762,535	214,125,215	.806	+ 17,316,305	— 23,006,173	+ 6.97	— 9.70
SUMMARY										
Appalachian	25,921,785	63,708,981	2.458	24,101,048	45,239,201	1.877	— 1,820,737	— 18,469,780	— 7.02	— 28.99
Lima-Indiana	4,773,138	6,588,068	1.380	5,062,543	5,983,356	1.182	+ 289,405	— 604,712	+ 6.06	— 9.18
Illinois	23,893,899	30,971,910	1.296	21,919,749	25,426,179	1.160	— 1,974,150	— 5,545,731	— 8.26	— 17.91
Mid-Continent	84,920,225	80,767,758	,951	97,995,400	78,671,902	.803	+ 13,075,175	— 2,095,856	+ 15.40	— 2.59
Gulf	8,542,494	7,993,997	.936	13,117,528	8,844,104	.674	+ 4,575,034	+ 850,107	+ 53.56	+ 10.63
California	97,788,525	45,709,400	.467	99,775,327	48,066,096	.482	+ 1,986,802	+ 2,356,696	+ 2.03	+ 5.16
Colorado and Wyoming	2,595,321	1,362,011	.525	3,783,148	1,880,086	.497	+ 1,187,827	+ 518,075	+ 45.77	+ 38.04
Other	*b*10,843	*b*19,263	1.777	*c*7,792	*c*14,291	1.834	— 3,051	— 4,972	— 28.14	— 25.81
Total	248,446,230	237,121,388	.954	265,762,535	214,125,215	.806	+ 17,316,305	— 23,006,173	+ 6.97	— 9.70

b Includes Alaska, Michigan, Missouri and New Mexico. *c* Includes Alaska, Michigan and Missouri.

The New Radio-X Lamp.

The announcement of the Radio-X Single-mantle lighting unit, by the General Gas Light Company, is an event of interest to every gas man. The industry has long suffered for a single burner lamp free from the disadvantages that have impeded the development of residence lighting. The standards of decoration and equipment demanded in the modern home are not satisfied with a gas lamp that quickly tarnished and blackened and soon discolored the fixture. And in spite of the many unquestionable advantages of gas lighting, the American housewife has withheld her approval.

The General Gas Light Company, not withstanding the great success of the Humphrey Arc Lamp, have now offered a single-burner heretofore, feeling that the answer to the puzzle had not been found. For a good many years however, Mr. A. H. Humphrey has been experimenting, and the Radio-X Single-mantle unit is the result.

Several interesting innovations have been introduced in the lamp, the most conspicuous being the use of porcelain enameled steel for the dome, the part that is subject to the greatest heat. This absolutely prevents discoloration and allows the burner to be finished in any color to match an ornamental shade or the decorations of the room. At the same time, by the arrangement of the ventilation outlets, the products of combustion are thrown upward and outward away from the lamp, and the fixture is protected from becoming tarnished by the escaping heat and gases. In like manner, the fresh air intake is so located that it is impossible for the products of combustion to foul the air supply, which passes up under the dome and is drawn into the bunsen tube properly heated. Another point is the blue flame pilot, invisible by day or night, an important feature is bedroom lighting, for instance. The gas cock is a single chain pull valve, the same in principle as the single chain pull that has proven so successful on the Humphrey Arc Lamp. The position of the valve is indicated by a pin convenient to the eye and fingers.

Every detail of the lamp has been studied, both for service and for appearance. The aim has been to produce a practical lighting unit that will afford perfect illumination through years of service, and with a minimum of maintenance and care. The quality, volume and efficiency of the downward illumination of the Radio-X unit surpasses anything before achieved. It is the product of a special process of combustion, in combination with the location of the mantle in relation to other parts, and positively insures permanent good service and satisfaction.

The introduction of the Radio-X Single-mantle lighting unit offers a great opportunity to every gas man. The general appearance of the lamp is distinctly pleasing. The standard finish is olive green enamel and brushed brass, which gives a very artistic effect. The lines of the burner make it inconspicuous and appropriate for the home, and the fact that it is proof against discoloration will appeal to every woman. The opportunity to introduce a touch of color is a point that will commend itself; to be able to offer a white enamel and nickel burner for the bathroom or kitchen, and a harmonious color combination of shade and burner to suit the decorations of other rooms, gives a strong selling point.

In short, the Radio-X unit appears to answer all the objections that have barred gas lighting from so many homes. And the gas company at last stands ready to invade the field of residence lighting with the balance of favor on its side.

Advertising and Selling.

One of the few gas men attending the Worcester, Mass., convention of the National Association of Corporation Schools was Mr. T. M. Ambler, of the Brooklyn Union Gas Company. In discussing the report of the Committee on Advertising, Selling and Distributing Mr. Ambler spoke as follows:

"Business is Advertising. Its life, stability and success depend, in a great measure, on the character and manner in which its general claims to consideration are presented.

"On the other hand, advertising is not always business, because, in my humble opinion, there have been and are now too many undertaking to make a business of advertising without either preparation or experience; these to be gained at the expense of trusting clients.

"Advertising as a direct selling force should be backed by, not only a thorough knowledge of, but an honest belief in, every factor of value contained in the article whose merit is to be acclaimed, This is the fundamental necessity that should impress every student ambitious to acquire proficiency in advertising and selling.

"The following quotation from the pen of an acquaintance of long standing—William Marion Reedy, editor of the St. Louis 'Mirror'—in commenting upon the death of Elbert Hubbard, seems to be of some value here:

"'Every man who expresses what he honestly thinks is true, is changing the spirit of the times. Thinkers help other people to think, for they formulate what others are thinking. No person writes or thinks alone—thought is in the air, but its expression is necessary to create a tangible spirit of the times. The value of a thinker who writes, or a writer who thinks, is that he supplies arguments for the people and confirms all who are on his wire, in opinions often before uttered.

"'All literature is Advertising. And all genuine advertisements are literature. The author advertises men, times, places, deeds, events and things. His appeal is to the universal human soul. If he does not know the heart throbs of men and women, their hopes, joys, ambitions, tastes, needs and desires, his work will interest no one but himself and his admiring friends.'

"What he says about people is equally true about the inanimate things of business, and a knowledge of humanity must be supplemented by a thorough understanding of these various aids, which make up the sum and substance of all business enterprises catering to the needs of our social and economic life.

"I recall reading some time ago, that in selling or advertising, the most important feature consisted in using the same expression that you would use in speaking to the average man or woman. Then, naturally, the question arises: To what extent should we appropriate the language of the street when endeavoring to impress our thoughts upon the memory of others; and whether it is not best to confine our expressions to the customs and language of the more intellectual, or to inject a few of the ordinary sayings of those actually needing the products we are trying to exploit.

"The more ordinary and possibly "slang" expressions invite considerations and are apt to fix attention on account of their terseness and, to many, unfamiliar sound.

"Curiosity on the part of both classes tends to incite further thought, which is also apt to fix in the memory the idea it is desired to convey; however, if it is desired to advertise and sell a book in which is embodied thought and language intended to appeal to those of more refined nature, then everything used to advance its interests should be written or spoken on this same high plane. This general policy should prevail in the exploitation of any book, from the most refined down to that which common decency debars from either written or oral discussion.

"There is a difference between advertising books and most other articles. As a rule, a certain character of book will only appeal to that same character of people, while many other articles, used in ordinary life, appeal equally to all classes of individuals, and it is the exploitation of these that require a more direct appeal to composite men and women.

"In every advertisement, or spoken plea, there should be one central idea that will arouse attention and help to fix the mind on the thing that will appeal strongly to personal interest, and at the same time incite desire for further information. Something that will arouse the imagination, and start a train of thought that will gradually create the same enthusiasm that impels you to the development and accomplishment of your purpose. Think—analyze—revolve and weigh matters from every possible point of view. Anticipate and refute every objection that may be advanced until you

have thoroughly convinced yourself that your position is impregnable and then concentrate your efforts on constructive lines and formulate your plea, written or spoken, so strong and forcibly as to exclude any chance of arousing opposition; at the same time be careful to remain conservative, dignified and truthful.

"'Truth is mighty and will prevail,' but it is well to remember that while a statement may be absolutely true, it is generally better to qualify it than to raise a doubt; and wiser to confine yourself to facts that are not only true but that will impress conviction of that truth on the mind and preserve it, impregnable and incontestable.

"We should endeavor to analyze the products we have to offer; the persons to whom we will offer them, especially the benefits they will derive and that which will most strongly appeal to usefulness, appearance, practicability; and then select the most plausible plea that will make people accept the valuation placed upon all of them.

"After reviewing the situation and becoming thoroughly imbued with the advantages to be derived by the greatest number, then and not before is the time to begin to formulate a line of expression, written or verbal, that will most strongly appeal to the average person needing the particular article it is desired to dispose of. As an illustraiion: Suppose we take the best and highest type, as well as a less expensive one of a similar type, and being thoroughly satisfied in our own mind that there are sound reasons why the best should be used in preference to the less expensive type; also that there are a certain number of people preferring the best, regardless of the cost, and others wanting the best but who must be convinced that they are not paying too much for it; then an argument or advertisement needs only to cover three points; First, the high quality; Second, the actual value and utility of the article for the price; and Third, the fact that those not desiring to use the best types can also get a proportionately good value in a less expensive article. In fact, advertising and selling are almost the same thing, the difference lying principally in the fact that the advertiser appeals without the reinforcement of personal presence, and that only serves to emphasize the absolute necessity of his being equally as well posted on the utility and value of what he is trying to advertise as the salesman.

"The advertiser cannot successfully advertise unless he knows the goods, while the salesman must both know his goods, and be able to quickly judge the individual with whom he is dealing. Both should be good judges of human nature and each should supplement the other. The advertiser should try to write as the salesman talks, and the salesman should try to talk as the advertiser writes,"

Recent Patent Issues.

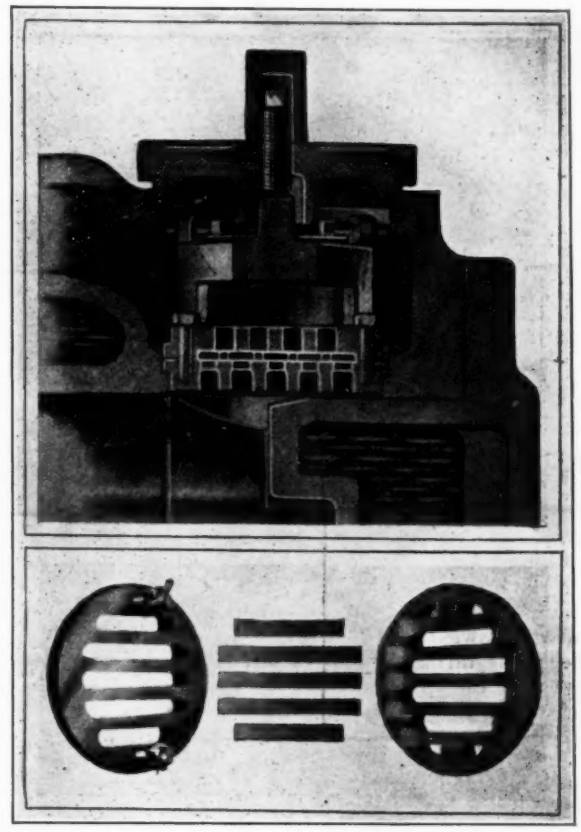
Prepared for the American Gas Light Journal by Royal E. Burnham, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,142,895. Coke Conveyor. D. F. Lepley, Connellsville, Pa.
1,142,928. Combined Gas and Coal Range. J. L. Bright, Chicago, Ills.
1,143,057. Burner for Water Heaters. B. E. Meacham, Lorain, O., assignor to American Stove Co., St. Louis, Mo.
1,143,344. Automatic Meter Control. D. R. Yarnall, Philadelphia, Pa., assignor to Yarnall-Waring Co., same place.
1,143,469. Shutter-Support for Gas Burners. H. C. Weiskittel, Baltimore, Md.
1,143,603. Broiler and Baking Attachment for Gas Stoves. Mabel Aaron, Stockton, Cal.
1,143,933. Time Actuating Device for Gas Cocks and the like. E. Barber, Hartford, Conn.
1,144,040. Gas Regulator. P. Keller, Chicago, Ills.
1,144,158. Gas Stove and Range. E. Trist, Pittsburgh, Pa.
1,144,165-6. Machine for Charging and Discharging Gas Retorts. H. A. Carpenter and R. L. Hibbard, Sewickley, Pa., assignors to Riter-Conley Mfg. Co., Pittsburgh, Pa.
1,144,167-8-9. Means for Controlling the Operation of Gas Retorts. H. A. Carpenter and Arthur W. Warner, Sewickley, Pa., assignors to Riter-Conley Mfg. Co., Pittsburgh, Pa.
1,144,199. Gas Burner Appliance. G. H. Hermann, Minneapolis, Minn.
1,144,427. Gas Control Valve and Igniter. C. J. Muehlmann, Detroit, Mich.
1,144,501. Air and Gas Mixing Device. C. R, Pomaville, Detroit, Mich., assignor to The Michigan Stove Co., same place.

New Methods and Appliances.

Compressor Valve of Spring Steel Strips.—A feather compressor valve has been brought out by the International Steam Pump Company, which consists of thin, flexible strips of non-corrosive steel similar in appearance to clock spring stock, held between a slotted valve seat with plain ground surface and a valve guard recessed to keep the strips from lateral motion and in exact position.

The valve strips are perfectly free, and rise as the air presses against them, flexing against the curved body of the valve guard, the ends remaining in contact with the seat, kept from rising by the curvature of the guard. Each element or valve unit, therefore, consists only of three parts; a thin light rectangular metal strip valve, covering, when seated, a somewhat smaller slot in the seat; a plain ground face valve seat; and a valve guard with properly milled port openings and recesses for retaining the valve. There are no springs to break, no plates to crystallize, and no point of rigid connection.



Compressor Valve of Thin, Flexible Strips of Non-Corrosive Steel. The Top View Shows the Valve Parts in Section. Below, the Valve Seat; the Valve Strips which Cover the Openings in the Seat, and the Guard with Curved Slats that Allow a Maximum Flexing at the Center of the Strip.

Aside from its simplicity of design, the manufacturers claim three special advantages. When the valve opens, the middle portion lifts while the ends remain in contact with the seat. It closes by increasing the point of contact, beginning at the ends and extending to the middle, doing away with all noise and destructive impact.

It is also claimed that the contact closing of the valve greatly reduces leakage and valve slip when the crank passes the center. The valve lifts sufficiently to give a normal opening through the double ported lift equal to the area of the seat, since the elimination of the closing impact allows a sufficiently high lift to give the equivalent area. The valve is lighter than any other form of valve, and the pressure required to open it is very slight. The expense of renewing them, should it become necessary, is obviously small.

The arrangement of the valves in the cylinders permits interchangeability of any valve between suction and discharge, the valve unit, consisting of valve, seat and guard, being insertible on either suction or discharge, permitting one spare valve to answer for both.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

GET ready for a hard winter. The season so far verifies the weather predictions of the Indians who occasionally visit the Mesa Verde National Park in Southwestern Colorado for trading purposes. Last fall the Mesa Verde prairie dogs deserted their villages for new ones, and the Indians said: "Rain, much rain; rain all summer;" and they seem to have predicted right. Now they are again shaking their heads. "Cold, much cold," they say; "bad winter coming."

MR. LOUIS N. RANCKE announces that he has made a connection with the Good Fire Brick Company, whose plant is at Lumber City, Pa., P. O. Patton, Pa., and will be located at their New England agent's office, 161 Devonshire street, Boston, Mass., until further notice.

MR. W. D. KELLEY, Superintendent of Meters, Consolidated Gas Company, New York, was elected a member of the Executive Committee at the recent convention of the National Association of Corporation Schools. He is also Chairman of the Nominating Committee.

THE Lehigh Coke Company, which operates at its South Bethlehem, Pa., plant 214 coke ovens and has 214 additional ovens under construction, has awarded the contract for a plant for crude and finished benzol products to Carl Still, Recklinghausen, Germany.

AT a conference between the city officials of Quincy, Mass., and Manager Nichols of the Citizens Gas Light Company, the company promised, October 1, a reduction of 10 cents per 1,000 feet in the price of gas. At the conference earlier in the year the agreement was that if, at the end of the fiscal year, the company's earnings equaled 6% the price would be reduced then. The returns, however, show that the earnings have been but 5½%, and the company promises to make a reduction the first of October.

THE Ogdensburg. (N. Y.) Gas Company has agreed to lay mains in Lafayette street, Ogdensburg, in the Spring of 1916, and the residents of that street have agreed that this will satisfy the complaint that they made to the Public Service Commission.

UNDER the terms of its franchise the Grand Rapids (Mich.) Gas Light Company cannot be made to run curb services to vacant lots on streets about to be paved. The clause governing is this: "The said company shall at the first installation of service run a service pipe to each property line free of charge where a written, application is made therefor by the owner or occupant and agreeing in such application to purchase gas of the company." The company has offered a fair compromise in agreeing to install service pipes for property owners who do not want to purchase gas at present, the owner to pay for the service, and when he contracts to purchase gas the company will refund him the cost.

IT is announced that next year the Iowa District Gas Association will hold a joint convention with the Iowa Electrical Association and the Iowa Street and Suburban Railway Association. The meeting will be in Dubuque.

C. L. OWEN, for the past twelve years the New Business Manager of the Springfield (Ill.) Gas & Electric Company, has resigned that position to enter a business of selling electrical appliances. The work formerly done by Mr. Owen will be taken care of in part by Henry Dirksen.

HARRY A. DAY, painter and paper hanger in Traverse City (Mich.) was given the alternative of paying $29.40 fine and costs or spending thirty days in jail for using gas without going through the formality of having a meter included in the equipment. Last December the gas meter was taken from Day's home by the Traverse City Gas Company but he still desired to use gas, and being handy with tools, he brought together the ends of the disconnected piping and made a non-leak joint with bicycle tape, an artistic job, but in the end an expensive one. When the gas company discovered what he was doing they determined to take action, because others are trying the same scheme.

THE withdrawal of the injunction suit brought by the Cleveland, Southwestern and Columbus Railway against the city of Lorain, O., to enjoin the municipality from enforcing an anti-electrolysis ordinance three years ago is a victory, for the city and the Citizens' Gas and Electric Company. The measure is described by electrical experts as being the most rigid ever enacted. Leakage of electrical current from uninsulated return conductors in contact with the ground—a classification which includes street car rails—was held down to a specified maximum voltage.

THE Wisconsin-Minnesota Light and Power Gas Company announces a substantial reduction in the price of gas in Chippewa Falls. The prevailing rate has been $1.50 per 1,000 feet. Hereafter this rate will be $1.30 net to consumers of 2,000 feet per month and less. More than 2,000 feet per month will be furnished at $1.20 net per 1,000 feet. If the consumption exceeds 5,000 feet, the next 5,000 feet will be $1.10 net. Where the amount consumed in a single month exceeds 10,000 feet, the excess will be at 95 cents net. Where the consumption is over 30,000 the gas in excess will be at 75 cents.

EDWARD G. COWDERY was elected president of the People's Gas Light and Coke Company at a meeting of the board of directors, following the resignation of James F. Meagher, on account of ill health. Mr. Cowdery had been the vice-president of the company. Stanley Field was elected a director to fill the vacancy caused by the resignation of Mr. Meagher. The following now comprise the board: Samuel Insull, J. J. Mitchell, James A. Patten, Stanley Field and E. G. Cowdery. The officers of the company are: Samuel Insull, chairman of the board; E. G. Cowdery, president; John Williamson, first vice-president; Edward J. E. Ward, second vice-president; L. A. Wiley, secretary; W. S. McCrea, treasurer.

SEVERAL hundred employees of the Springfield (Mass.) Gaslight Company made merry last week at Riverside park. The gas company works on a 24-hour schedule, so all its workers can't recreate at the same time. The night shift got up unusually early in the morning and was at the park before most of the concession men had taken down their board fronts. They made the most of their time though, and the park management started some of the amusement devices earlier than schedule for their benefit. The first bake was served at 10.30 a. m. for the benefit of the men who had to get back to town. About 150 sat down to a feast of the usual clambake delicacies. At 1.30 the day force, numbering 250, ate their bake. The afternoon was spent in the usual festivities.

IN the valuation of the Seattle Lighting Company, the Washington Public Service Commission find that the gas company's business has increased since 1904 at a greater rate than any other public utility. In the ten-year period from 1904 to 1914, the population of Seattle increased approximately 200%, the mileage of its street railway lines 200%, the mileage of water mains 250%. The number of gas services in the same period increased 365%, the investment in the plant 330% and the mileage of gas mains 290%.

THE Newton and Watertown (Mass.) Gas Light Company will reduce its rates in Newton, Waltham, Watertown and Weston from 90 cents to 85 cents, beginning August 1st.

IN spite of the stipulation in an Act of Congress that not more than 70 cents per 1,000 feet can be paid to the Washington Gas Light Company for gas used "in any of the public buildings of the United States or the District of Columbia," it has been ruled by the comptroller of the Treasury that the limitation in price is effective only for buildings of the District since the provision is contained in an appropriation act for the District and specifically applies only "to appropriations under this act." The matter was referred by the Secretary of the Treasury who wished a ruling on whether the provision applies to gas used in buildings of his department.

The Bucks County Public Service Company will shortly close down its plant at Langhorne, Pa., and will buy gas from the Suburban Gas and Electric Company, which will lay mains from Jenkintown to Newtown. The work of laying the mains will be started as soon as the pipe arrives, and will be extended from State street and Centre avenue, Newtown via Richboro, Southampton, Davisville and Ivyland. Gas service will be furnished in all of these towns.

WHEN William McKinley bought the Galesburg (Ill.) Gas and Electric Company twenty-six years ago, he was under the impression that he was buying a perpetual franchise. Because of this understanding the city argues before the Gas Arbitration Board, McKinley was willing to pay a sum exceeding the actual value of the physical property. The amount paid was $285,000. Testifying before the Board, ex-city Attorney C. L. Ogden submitted acts and franchises regarding the supposed perpetual franchise. The act of February 18, 1861, granted the Galesburg Gas, Light and Coke Company the right to operate and maintain a gas works. The incorporators as listed in the act were: George J Bergen, William E. Dunne, Clark E. Carr, Alonzo M. Swan and Richard H. Whiting. Mr. Ogden testified to the extended litigation over the question of whether or not the company had a perpetual franchise, and the compromise finally reached by a new franchise passed by the city council in May 1910. Under this franchise the company is now operating. The city maintained that the gas plant, when purchased by the McKinley syndicate, was worth about $150,000.

A BOSTON paper says a great many concerns with widely diversified interests have been beneficiaries of the flood of war orders, but few people realize that such a staid old public utility as the Massachusetts Gas Companies is engaged in the manufacture of explosives. But it should be remembered that, in addition to its service as a manufacturer and distributer of gas, this company has quite an extensive manufacturing plant and indeed in recent years the expectations for larger dividends have been based almost wholly on the expansion of this outside business. Through the formation of a new subsidiary the New England Manufacturing Company the Masschusetts Gas Companies is to engage in the business of manufacturing picric acid and trinitrotoloul, the latter being the basis for a powerful explosive. If the present demand for these products continues for a year it is estimated that the company can earn about 5% for the parent company's stock after deducting the cost of the new plant."

THE Milwaukee Gas Light Company is undertaking more extension this year than in many past, according to General Manager R. B. Brown. "The Milwaukee Gas Light Company has faith in Milwaukee's future," he said: "It feels that investments made in districts where population is sparse will be repaid when those districts attain the activities that are certain to come." The improvements planned for this year include extensions of mains to many outlying sections and enlarging of mains in other parts of the city.

GAS arc lights have been installed in the public park at Lehighton, Pa., by the New Parryville Consolidated Gas Company.

THE Vinton (Ia.) Gas Company has moved into new office quarters, where it will be possible to make more effective displays of appliances.

THE Carolina Power & Light Company has recently completed the laying of about a mile and a half of new mains in Durham, N. C., spending approximately $10,000 for this new work. Mr. N. L. Clay, manager of the local company, announced that the next important extension will be to West Durham.

THE Springfield (Mo.) Gas & Electric Company has divided that city into three districts to provide for the serial collection of bills. Ths change is made to facilitate the distribution of bills and to enable the company to wait on the patrons more conveniently. The districts are divided as to meter reading routes, in a general way as follows: District No. 1, north part of city; District No. 2, south part of city; District No. 3, business district of the city. The north part will receive its bills about the 10th of each month; the southwest part on the 20th, and in the business district the patrons of the company will receive bills on the 30th of each month.

AT a meeting of the Huron, O., council the matter of a gas franchise to Vermilion parties who applied several weeks ago, was brought up for final consideration. The franchise is similar to the one recently adopted by the Vermilion council. It is complete and specific in all of its details, and specifies the prices to be charged for gas, regulates the laying of pipes, etc., and places the village council in entire control as to how the proposition shall be conducted.

UTILITIES COMMISSION NEWS.

MAY USE PREMIUM.—The California Railroad Commission has issued an order authorizing the San Diego Consolidated Gas and Electric Company to reimburse its treasury by $24,000, the premium on the sale of common capital stock of the par value of $240,000. This reimbursement is for capital expenditures for boilers, generators, transformers, etc., to the amount of $24,421.99.

HAS NO JURISDICTION.—In declaring that it has no jurisdiction over appeals from the decisions of the Pennsylvania Commission, under the revised act of June 3, the Dauphin County Court has left nearly two score of such appeals from various business men's and improvement associations undecided, with no apparent way of ever questioning the decisions in court. Under the 1913 act, the Dauphin County Court was named as the tribunal to hear all appeals from the commission decisions. When this act was superseded on June 3 the appeals were directed to the Superior Court with the proviso that they must be made within 30 days of the commission's decision. About forty decisions had been filed for argument in the Dauphin County Court, and when the first of these was called the court announced that under the latest act it had no jurisdiction. As more than 30 days have elapsed since the commission's decision, there are no means of disposition of these appeals. Already several appeals have been made to the Superior Court, and at least one of these will question the constitutionality of the new act.

NEW YORK PROPOSED CHANGES.—In the Constitutional Convention now in session at Albany, the Committee on Public Utilities has voted 12 to 2 in favor of giving a broad court review of both the facts and the law in decisions of the State Public Service Commission; and the commissions are to have exclusive rate making power for all public service corporations. The committee also decided to continue the present two Commissions and protect the present members in office, despite the fact that four of the five members of each commission are Democrats, and leave to the Legislature the fixing of their salaries.

W. M. K. Olcott, Hubert C. Mandeville, of Elmira, and Senator James F. Foley were appointed a sub-committee to draft the Public Service Commission article in accordance with the views of the committee.

COMMISSION TOURS STATE.—The "get acquainted" trip of the Idaho Public Utility Commission was started on July 8. In planning an itinerary covering the Southern and Eastern part of the State, the commissioners hoped to bring their work closer to the people. They will confer with the people regarding their wants and complaints against public utilities. A similar trip was made over the Northern part of the State, and proved to be of great benefit. President Axel P. Hampstedt and Commissioners A. L. Freehafer and John W. Graham planned the trip.

The itinerary extended from July 8 to July 25, and covered Gooding, Wendell, Jerome, Buhl, Twin Falls, Minidoka, Burley, Rupert, Blackfoot, Mackay, Idaho Falls, St. Anthony and Ashton. The commission will investigate various matters and hold a number of hearings.

WOULD DESTROY DUPLICATE MAINS.—The Engineer of Sub-surface Structures for the Public Service Commission, First District, New York, has made a report on the congestion existing under the surface of many streets in the city, because of the duplication of disused mains. Much of it, he finds, is due to duplication of gas mains, resulting from the number of separate companies authorized to do business in the city.

He recommends that steps be taken to arrange with the Consolidated Gas Company, and other owners of sub-surface structures, whereby duplicate and unused mains may be removed, and the space underneath the streets systematically assigned to the structures which must be continued.

In the building of the new subways the commission's engineers are continually working on this problem, for the commission has the right to displace water and gas mains to make room for the subway structure, but it is also obligated to relay all pipes so displaced in such condition that the service shall be as good as before. This obligation extends to duplicate and disused pipes as well as those which are necessary, with the result that after a large portion of the sub-surface has been taken for a subway, the other sub-surface structures are more congested than before.

Financial Notes.

THE PACIFIC GAS AND ELECTRIC COMPANY reports for the five months ending May 31:

		Increase.
Gross operating revenue	$7,749,538	$679,309
Expenses, taxes, etc.	3,686,124	83,399
Balance	4,063,414	595,910
Reserves	595,000	95,834
Net from operation	3,468,414	500,000
Other income	137,244	*1,078
Total net income	3,605,658	498,998
Surplus after interest and discount	1,794,264	649,032
Total dividends	445,333	145,333
Surplus unapportioned	1,348,931	503,699

* Decrease.

The report says that the board of directors has decided to make no cash disbursement on the common stock for the remainder of the year.

THE thirtieth annual report of the Massachusetts Gas and Electric Commission for year ending June 30, 1914, shows a consolidated statement of 70 gas companies as follows:

	1914.	1913.	1912.
Income	$15,051,135	$14,091,982	$12,858,592
Expenses	11,291,059	10,112,265	9,306,046
Net profit	3,760,076	3,979,717	3,704,196
Deficit of div. charges, etc.	206,259	6,121	*352,989

* Surplus.

Five companies did not earn expenses, compared with 7 last year, and 14 did not earn enough to warrant a dividend declaration, compared with 12 last year. The 54 companies paying dividends paid $3,709,824, an average rate of 9.04% on their stock; compared with dividends of $3,599,451, or 9.6% in previous year. Actual surplus of gas companies June 30, 1914 was $7,614,011, or 18.09% on capital, compared with 20.63% in previous year, and 25.41% in 1912. Property of gas companies was assessed at $59,690,400, and $1,235,643 was paid out in taxes. Seven companies reduced the price of gas to consumers, the average price being 85 cents per 1,000, the same as in 1913, and compared with $.857 in 1912. Consolidated statement of all electric light companies in the state follows:

	1914.	1913.	1912.
Income	$16,771,413	$15,128,212	$13,580,030
Expenses	10,025,352	8,995,055	7,076,348
Net profits	6,746,061	6,133,157	6,503,682
Surplus after charges, etc.	266,013	29,698	232,587

Five of these did not earn expenses, and 14 did not earn enough to warrant payment of a dividend, compared with 6 and 16, respectively, in 1913. The 39 companies paying dividend distributed $3,503,404, an average rate of 10.22% on their capital stock. Actual surplus of the electric corporations as of June 30, 1914, was $4,675,791, or 13.51% on capital, compared with 12.22% in previous year. Aggregate assessed valuation of property of all electric companies is $49,760,681, not including the electric plants of gas companies. The electric corporations in year paid $1,505,878 in taxes. Twenty-one companies reduced the price of electricity for commercial use in year. Municipal plants in 37 cities and towns, of which four supply both gas and electricity, and the others electricity, report as follows:

Electricity—	1914.	1913.	1912.
Income	$1,090,878	$1,052,497	$916,227
Expenses	922,058	839,176	765,910
Net	168,820	213,321	150,317
Surplus after depreciation, etc.	58,020	2,710	68,106
Gas—			
Income	300,343	290,188	282,118
Expenses	233,945	212,244	205,813
Net	66,398	77,944	76.305
Surplus after depreciation, etc.	61,617	71,009	60,605

CONSOLIDATED GAS, which has been advancing recently, is showing further strength, having sold at 129⅛. The directors meet July 29 for dividened action. Three months ago they put the stock on a 7% basis by declaring an extra quarterly dividend of ¼ of 1%, and certain interests are in favor of the declaration of an extra quarterly dividend of ½ of 1% at the coming meeting. This would put the stock on an 8% basis. At the last weekly executive committee meeting the estimated results for the half year ended June 30 were presented, but the only statement made after the meeting was that the earnings are entirely satisfactory. A good showing for the half year was due not so much to a small gain in electric and gas output, but to savings in operating expenses, through the lower cost of gas oil. Operating expenses in the last half of the current year are not expected to do any better than those of the same period a year ago; but the reduction in the first half of the year means a considerable percentage of earnings on the $100,000,000 stock.

THE California Railroad Commission has issued a supplemental order in the application of the SOUTHERN COUNTIES GAS COMPANY to use the proceeds from the sale of $150,000 of its three year 6% gold notes to pay certain notes and accounts payable. Permission to do this was granted April 1, 1915, and later the applicant sought authority to use a part of the money from this sale of notes to buy $20,000 par value of its first mortgage bonds for sinking fund purposes. This permission is now given by the commission on condition that the bonds be placed in a sinking fund provided under applicant's first mortgage and deed of trust.

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